MiFID II Research Unbundling: Cross-border Impact on Asset Managers*

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ABSTRACT

MiFID II requires EU investment advisors to "unbundle" research costs from execution fees. We find evidence that this unbundling for EU Funds is accompanied by an increase in bundled commissions generated by their US counterparts. Specifically, for EU funds with US twins (a US-based fund with the same management team and investment style), the US twin exhibits higher bundled commissions (also known as "soft dollars") and worse net performance than other US funds following MiFID II mandated unbundling. Correspondingly, EU twin funds appear to profit from this cross-subsidization, outperforming similar US twins. Our findings suggest that agency costs are not mitigated but merely shifted from a more regulated market to a less regulated one. We conclude that in global financial markets, only internationally coordinated regulatory actions are effective.

JEL classification: G20, G24, G28

Keywords: MiFID II, soft dollars, unbundling, mutual fund, equity research, brokerage commissions, expenses, cross-border regulations, global financial markets

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1 Introduction

On January 3, 2018, the second implementation of the Markets in Financial Instruments Directive (hereafter, MiFID II) became officially mandatory for all country members of the EU.[1] This legislation constituted a new regulatory framework for financial markets, agents, and transactions in the Union. One of the most impactful (and contested) rules included in the directive is the new requirement for any financial advisor operating in the Union to "unbundle" brokerage research expenses and trading commissions. Under the new regulation, research acquired by management companies of funds subject to the regulation of the EU can no longer be bundled with brokers' trading costs (a practice known as paying with "soft dollars"); it must be expensed by the management company directly in its profit and loss account or charged to the investment owners (e.g., mutual fund investors) through explicit Research Payment Accounts (RPA). Regardless of the method, under the new regulation, equity research providers (wherever they are located) catering to funds subject to MiFID II must receive "hard dollars" for their services.

With this change, regulators aimed to foster increased transparency in fee setting and improve accountability among management companies who, arguably, by either expensing research costs or turning them into an explicit research fee, would internalize and rationalize such costs. Proponents of the regulation argued that greater transparency would result in trimming unnecessary research expenses and potentially curbing agency conflicts inherent in bundling. However, we provide evidence that some EU funds engage in regulatory arbitrage by continuing to bundle via a twin fund in another geography. Specifically, our results suggest that post MiFID II implementation, the US twin of some EU funds (i.e., a US-based version of the fund with the same management team and investment style) increases its use of commission bundling after its EU counterpart loses the ability to pay for research with bundled commissions.

In addition to documenting this regulatory arbitrage, our setting gives a unique insight into the usage and the performance impact of these bundled expenses. On the surface, the

[1] Directive 2014/65/EU of the European Parliament and of the Council of the EU, May 15, 2014.

initial MiFID II unbundling requirement appears as an ideal experimental design because EU funds that had previously been bundled had to choose between directly expensing or internalizing these costs. If researchers could observe the amount of bundled research costs before and the amount of research costs expensed after, along with performance measures before and after the change, this would give important insight into the potential agency costs associated with bundling. However, this approach is not feasible for two reasons. First, there is no breakdown of research costs for EU funds before the regulatory change. Second, such a small number of investment advisors chose to expense after the change, and researchers have little to no insight into how these research expenditures changed with the regulation.[2]

Our empirical approach focuses on the sample of EU funds with a US *twin*. Since 2018, fund management companies operating in the US and Europe must unbundle research costs for their European funds in compliance with MiFID II. Importantly, some of the same management companies continue to bundle trading and research costs for their US funds after the European regulatory shock. Because the two twin funds are separate portfolios run by the same manager implementing the same investment strategy, the research paid for by bundling at the US fund could benefit their EU twin. Moreover, US funds could shift expensed research costs from their EU twin to bundled costs associated with the US fund.

We conjecture that US management companies that began to unbundle and expense research costs for their European funds following the mandate of MiFID II subsidize this extra expense with higher soft dollars from their twin US funds not subject to the unbundling regulation. This cross-subsidy is the main hypothesis of our paper.

We test our hypothesis in a sample of 2,437 unique US-domiciled funds that belong to 451 fund families from 2014 through 2019. This translates into a total of 12,289 fund-year observations. As a first step in the analysis, we use the twins identification to implement a difference in differences test on the bundled research commissions (i.e., soft-dollar

[2]In conversations with European supervisory agencies like the Spanish CNMV, it became clear that even in the reserved financial statements privately filed by management companies to the regulator, research expenses are not singled out when they are expensed. This is even more obvious in the public statements disclosed by the management companies, where any mention of research expenses we found only refers to aggregated amounts.

arrangements) of US twin funds (treatment group) after the 2018 MiFID implementation, relative to the commissions charged by similar US funds managed by companies without EU twin funds (control group). Under the null hypothesis, in the absence of fees cross-subsidy, the difference in soft dollars between US twin and no-twin funds should not widen after 2018. Otherwise, if the null hypothesis is rejected, US twin funds will charge larger commissions than US funds managed by companies with no European twins after MiFID II is effective in the EU.

Our tests reject the null hypothesis. The average US fund with European twins increases commissions (as a percentage of the fund TNA) by 3.6 basis points (b.p.) relative to no-twin US funds after MiFID II becomes mandatory. This increase is statistically (at the 1% level) and economically significant (the average percentage commission for the full sample is 9 b.p.). We confirm the robustness of this finding through several tests. Thus, the results are shown to be robust when commissions are scaled by turnover volume instead of TNA; they are concentrated among US funds that use soft dollars (and not replicated by those who do not use them); the results vanish in a placebo test when European twins are replaced with Canadian twin funds (not affected by MiFID II); and they are robust to the inclusion of fund fixed effects.

We then continue our analysis by comparing the performance of US twin funds (treatment group) with similar US funds without European twins (control group) after MiFID II. We document that treatment funds underperform control funds by 23 b.p. per year on average after MiFID II became mandatory in January 2018. The underperformance (alphas) is robust to different risk-factor models and to considering gross or net fund returns. We also show that only US funds with soft dollar arrangements underperform, and this result vanishes when, in a placebo test, we replace EU twin funds with Canadian twin funds unaffected by the unbundling ban of MiFID II.

Finally, we test if European funds outperform their US twins (e.g., US funds with the same investment style and managed by the same firm) after MiFID II. We conjecture that if costs associated with commission bundling are passed from the EU fund to its US twin after

2018, gross of other fund expenses, the US version of the fund should underperform by the amount of those costs.

Under the null hypothesis (i.e., no transfer of necessary research costs after MiFID II across the Atlantic), European funds with US twins should not outperform. Under the alternative hypothesis, the cross-subsidy of research costs gives European funds with US twins a research information advantage that should translate into higher risk-adjusted performance. Our results easily reject the null hypothesis in favor of the alternative: EU twin funds outperform similar US twin funds by about 13 b.p. per year after 2018.

This evidence of an unintended consequence of MiFID II, namely cross-subsidization of EU fund research expenses by their US counterparts, is an important insight in and of itself. However, for our research purposes, it gives us a unique setting to examine the potential positive impact of such bundled research expenses. In particular, we can identify the gross impact on EU fund performance because EU investors benefit from but do not pay for the US twin fund bundled research costs. We can then estimate the net impact on EU fund performance using the estimates of the US twin fund bundled costs.

We add to two strands of the literature. First, to the existing literature on the production of information in financial markets (e.g., Veldkamp (2006a), Veldkamp (2006b), Van Neieuwerburgh and Veldkamp (2010)). Some papers have used MiFID II as a regulatory shock to study the implications for the amount and quality of research produced by buy-side analysts (e.g., Fang (2020), and sell-side analysts (e.g., Lang et al. (2024)). Guo and Mota (2021) show that unbundling causes fewer research analysts to cover a given firm, supporting the rationalization of research expenses. However, contrary to the concerns voiced by industry experts before 2018, this decrease in coverage does not come from small- or mid-cap stocks but is rather concentrated in large firms. According to their evidence, the research market is going through a concentration process where only the best analysts survive. This competition would push up the quality of research and, arguably, fund performance. Relative to these papers, we shift the focus from the analysts to the investors. Our sample data allows us to implement a difference-in-differences methodology to quantify

the effect of the regulatory change on both the fees and the performance of funds affected by unbundling relative to those unaffected.

We also contribute to the literature on fee saliency and transparency (e.g., Barber et al. (2005), Edelen et al. (2012), and Di Maggio et al. (2022)). These papers study fee bundling and unbundling decisions by management companies in the context of agency conflicts between asset managers and their clients. In our case, unbundling is exogenously imposed through a regulatory change that affects US companies advising EU-domiciled funds. We used this exogenous treatment to study the effect on fee cross-subsidies and fund performance.

The rest of the paper proceeds as follows. Section 2 introduces the institutional setting of MiFID II. Section 4 describes the process of building the database to test our hypotheses. The main empirical results of the paper are presented in Section 5. Section 7 offers the final conclusions.

2 Institutional setting

In Europe, before MiFID II, asset managers' research budgets were accumulated in the broker's account as the excess money above transaction commissions (also known as "soft dollars") and assigned to sell-side analysts who were ranked according to what is known as "brokers voting" (effectively, a ranking of analysts for each asset manager). This system was known as Commission Sharing Agreements (CSA). The brokers' voting processes, however, "often lacked detail in recording what the fund manager was valuing when voting for a particular research provider," and research expenses were ultimately bundled into trading.[3] In this supply-driven system, research costs were then passed on to the asset managers' clients. In the case of mutual funds, it was passed to final investors through the trading commission fees bundled with trading fees. The objective was, arguably, to induce trading since the research budget was set as a proportion of trading as soft dollars. The system was, therefore, rather obscure and prone to agency conflicts that materialized in inflated trading

[3] "Discussion on the use of dealing commission regime: Feedback on our thematic supervisory review and policy debate on the market for research" FCA Discussion Paper 14/3 (2014).

commissions, biases in research, over-production of research reports, low quality of research, and lack of incentives to monitor costs.

After MiFID II, CSA must be replaced with Research Payment Accounts (RPA) collected by the asset manager, in which itemized research expenses are charged to the investment owners (e.g., mutual fund investors). The amount of "red tape" involved in this process, the complexity of allocating research to specific funds, and the commercial and marketing pressure from asset managers' clients finally prevented most asset managers from adopting this option. Instead, most brokers and dealers decided to expense research costs in the profit and loss account.[4]

With this change, EU regulators aimed to foster transparency in fee setting and improve accountability among management companies who, arguably, by either expensing research costs or turning them into an explicit research fee, would internalize and rationalize such costs, hence trimming off unnecessary research expenses, and curbing potential agency conflicts embedded in the bundled arrangements. If these goals are attained, investors should profit from the regulatory change.[5]

For US broker-dealers providing research to EU investment managers, receiving hard dollars in exchange for research may constitute "special compensation" which, under the Investment Advisers Act, can be only provided by registered investment advisors. Registering, however, is not an alternative for these brokers since it imposes onerous compliance and reporting requirements and, ultimately, a change of business model. The solution was a "temporary exemption relief," originally intended for 30 months since January 3, 2018, and later extended until July 2023, during which the SEC's Division of Investment Management "would not recommend enforcement action to the SEC if a broker-dealer provides research services that constitute investment advice under section

[4]Even Fidelity International (who originally defended them) gave up RPAs and finally decided to assume research costs internally. See "The definitive list of asset managers that will pay for research" Financial Times, February 22, 2018.

[5]Management companies, however, vehemently opposed the reform, arguing that the new rules would "commoditize" equity research and, as a consequence, specialized, value-adding research (particularly into smaller and less liquid stocks) would be in short supply. This would lead to lower fund performance than US funds, which still use predominantly soft dollars, ultimately damaging EU fund investors' interest.

202(a)(11) of the Advisers Act to a Manager that is required to pay for the research services by using Research Payments."[6] This temporary period was intended to permit US firms to comply with the research payment requirement without substantially altering the treatment of those activities by the SEC while providing the SEC with an adequate period during which it can analyze, evaluate, and better understand the impact of the research payment requirement on the firms' business practices. In a recent statement, William Birdthistle, Director of the Division of Investment Management at the SEC, announced that "the Division does not intend to extend the temporary position beyond its current expiration date in July 2023. Accordingly, the Division plans for the temporary position to expire on July 3, 2023, and does not expect to issue further assurances with respect to the adviser status of broker-dealers accepting compensation under MiFID II arrangements."[7] On the European side, the EU Parliament and the Council approved in February 2021 to partially remove the unbundling requirement for the trading on stocks issued by SMEs.[8] In particular, it stipulates that "investment firms should be allowed to pay jointly for the provision of research and for the provision of execution provided... the research is provided on issuers whose market capitalization did not exceed EUR 1 billion, as expressed by the end-year quotes, for the 36 months preceding the provision of the research."

3 The model

We base our model in Berk and van Binsbergen (2015). Active fund managers can generate an expected alpha before fees and expenses equal to $a - bq$ per dollar of total net assets (TNA) q. This assumptions captures the diseconomies of scale in managers ability to find and exploit positive net present value investment opportunities in limited supply. The parameter $a > 0$ can be interpreted as the expected gross alpha on the first cent of investment and $b > 0$ as the rate of decreasing returns to scale. Thus, the dollar value added by active management

[6] "Response of the Chief Counsel's Office Division of Investment Management" Investment Advisers Act of 1940 - Section 202(a)(11). Securities Industry and Financial Markets Association. October 26, 2017.

[7] Remarks at the Practicing Law Institute, July 26, 2022.

[8] Directive 2021/338 of the European Parliament and the Council of 16 February 2021.

before fees and expenses will be $V = q(a - bq)$.

Producing a positive gross alpha requires costly investment in information. We assume that part of this cost is charged by the fund in the management fee f per dollar of TNA. This fee is included in the fund's expense ratio. Additionally, the fund uses a full-service broker that charges a commission $c < 2$ per dollar traded in exchange of equity research and other services bundled with purely trading execution costs.[9] Let t denote the fund's turnover ratio (dollar trading value as a percentage of the fund's TNA). Trading commissions are not included in the fund's expense ratio. Therefore, the soft dollars charged by the broker are a function of the turnover ratio:

$$S(t) = qct \tag{1}$$

Therefore, the actual expected net fund performance (alpha) will be a function of the fund's turnover:

$$E(\alpha(t)) = a - bq - f - ct \tag{2}$$

3.1 The effect of bundled commissions

Unlike with management fees, mutual funds are not obliged to disclose the details of soft dollar arrangements to investors. The total commissions (bundling execution and research costs) are reported in the Statement of Additional Information (SAI), less prominently that management fees, which are reported in the prospectus. We model this asymmetry of information in a reduced form by assuming that investors only internalize a fraction $\delta < 1$ of the soft dollars charged by the broker.

Therefore, under asymmetric information, the net alpha after fees and expenses expected by investors will be

[9] For simplicity, and without loss of generality, we assume zero pure trade or execution costs. c is exogenous in our model and it is assumed to be determined in a competitive market for equity research services.

$$E_\delta(\alpha(t)) = a - bq - f - \delta ct \tag{3}$$

The difference between the actual net alpha in equation (2) and the investor's expected net alpha under asymmetric information in equation (3) is crucial for our results. Of course, for (3) to be possible in equilibrium, the under estimation parameter δ must be pervasive across funds. Otherwise, under performing funds would eventually disappear from the market.

Like in Berk and Green (2004), we assume that investors supply capital to funds with perfect elasticity until their expected net alpha equals zero. In other words, managers appropriate all the value added through management fees. Given (3), $E_\delta(\alpha(t)) = 0$ implies that the expected dollar value of fund fees is equal to

$$qf = q(a - bq - \delta ct) \tag{4}$$

Managers know that investors underestimate the true cost of research in soft dollars. Hence, they decide the size of the fund that maximizes the total dollar fees. In other words, they maximize the right-hand side of equation (4) over q. Solving this yields the optimal fund size as a function of the fund's turnover t:

$$q(t) = \frac{a - \delta ct}{2b} \tag{5}$$

Replacing (5) in to (4) we obtain the optimal fee rate that induces investors to supply the value maximizing capital in equation (5):

$$f(t) = \frac{a - \delta ct}{2} \tag{6}$$

Equation (6) captures the inverse relation between fees and soft dollar commissions described by Livingston and O'Neal (1998) whereby "ideally, mutual fund management fees should be reduced to offset any non-brokerage services purchased with soft dollars." The *ideal* scenario would correspond to $\delta = 1$ in the absence of asymmetry of information.

However, for $\delta < 1$, brokers have an incentive to increase the fund's turnover. We show this next.

Given the commission rate c, the broker chooses the turnover ratio t that maximizes the soft dollar value. Replacing (5) into (1) and maximizing over t yields the broker's optimal turnover ratio:

$$t(\delta) = \frac{a}{2\delta} \tag{7}$$

Equation (7) illustrates the agency costs of soft dollar arrangements. Under asymmetry of information and imperfect monitoring ($\delta < 1$), brokers have an incentive to increase portfolio's turnover. Even if the broker does not decide herself the fund's actual turnover, she can *induce* her optimal ratio by selecting the equity research shared with the fund manager. Let

$$t^* = t(1) = \frac{a}{2}$$

denote the zero inducement turnover. Thus, we can define the (percentage) trading inducement as follows:

$$i(\delta) = \frac{t(\delta) - t^*}{t^*} = \frac{1}{\delta} - 1 \tag{8}$$

The trading inducement over t^* is larger when the asymmetry of information about bundling is higher or monitoring by the fund manager is weaker. In other words, when δ is smaller.

Let us define

$$c^* = ct^* = \frac{ac}{2} \tag{9}$$

as the inducement-free commission per dollar of fund TNA the fund should pay to the broker to obtain the information necessary to deliver a gross alpha a for the first cent of TNA. Replacing (7) into (5) and (6), we obtain, respectively, the optimal fund size,

$$q^* = \frac{a - c^*}{2b}$$

and management fee

$$f^* = \frac{a - c^*}{2}$$

chosen by the fund manager. Notice that both q^* and f^* are independent of δ. In other words, the fund manager has no incentive to monitor the broker or make soft dollar disclosure more transparent. Regardless of δ, he always obtains the same (optimal) dollar fees

$$q^* \times f^* = \frac{a^2(2-c)^2}{16b} \tag{10}$$

and adds the same (gross) value

$$V^* = q^*(a - bq^*) = \frac{a^2(4-c^2)}{16b} \tag{11}$$

to investors. Given the definition of soft dollars in equation (1) and the inducement free commission c^* in equation (9), let us define the hard dollar function

$$H(q) = qc^* \tag{12}$$

as the dollars the fund must pay to the broker for research in the absence of any inducement. Let us then define

$$H^* = q^*c^* = \frac{a^2c(2-c)}{8b}$$

as the amount of hard dollars for that a fund of size q^* would have to pay to the broker to add value V^* to investors without trading inducement. With bundled commissions, however, fund investor's suffer the cost of suboptimal overtrading by paying extra soft dollars ΔS above H^*. Given the trading inducement defined in equation (8) and the zero-inducement research

expense H^*, we define ΔS as:

$$\Delta S(\delta) = S(t(\delta)) - H^* = H^* \left(\frac{1}{\delta} - 1 \right) = H^* \times i(\delta) > 0 \tag{13}$$

ΔS is a dollar transfer of value added from fund investors to the broker. Let $\alpha^* = \alpha(t^*)$ be the fund's expected after-fee performance in the absence of inducement. Comparing (2) and (3) it follows that, in equilibrium, we should expect that

$$E_\delta(\alpha^*) = E(\alpha^*) = 0$$

That is, in the absence of inducement, soft dollar and hard dollar arrangements should result in the same zero net expect fund performance. From this equality and equation (13), it follows that the fund's expected net performance under soft dollar arrangements should be equal to

$$E(\alpha(t(\delta))) = -\frac{\Delta S(\delta)}{q^*} < 0 \tag{14}$$

This can be summarized in the following proposition:

Proposition 1 *The expected underperformance induced by soft dollar arrangements is equal to the extra commissions paid by fund investors to the broker, relative to the hard dollars necessary to achieve the same value added, scaled by the fund's TNA.*

The underperformance is higher for smaller δ, that is, when the asymmetry of information regarding soft dollars is higher or broker monitoring weaker. This is precisely the motivation behind the ban on bundling equity research and execution costs in trading commissions introduced by MiFID II. Since fund managers have no incentive to internalize the costs of broker's overtrading, this must be imposed by the regulator.

3.2 The effect of MiFID II ban on bundling

Under MiFID II, fund managers in the European Union (EU) cannot buy research with soft dollars since January 2018. Hence, after that date, any research cost must be either charged to investors though explicit Research Payment Accounts (RPAs) or internalized and paid to the broker by the fund with hard dollars (i.e., independently from the fund's turnover).

Let us consider the first option, that is, passing research costs to the fund investors. In that case, investors pay (zero inducement) hard dollars H^* to the broker through the fund. The fund will collect fees $q^* \times f^*$ in equation (10). The fees charge by the fund plus the hard dollars collected from investors and passed to brokers sums up the total value added V^* in equation (11). Since there is no inducement, ΔS in equation (13) is zero and so is the fund's expected net performance after fees and hard dollars spent in external research $E(\alpha^*) = 0$.

Let us now study the second option, that is, the fund internalizes the research costs and pays for them. It is important to emphasize that, in this case, investors cannot monitor the money paid by the fund to the broker for research. Let us assume for the moment that the fund buys no external research. Let $\hat{a}$ be the maximum gross alpha the fund can produce *in-house* (i.e., without buying any external research) for the first dollar cent invested. In that case, given equation (5) and zero research commissions $c = 0$, the fund will choose an optimal fund size

$$\hat{q} = \frac{\hat{a}}{2b}$$

that will be obtained by charging, according to equation (6), a management fee rate

$$\hat{f} = \frac{\hat{a}}{2}$$

to investors. Assume first that $\hat{a} > a - c^*$. Then, the fund would raise dollar fees equal to $\hat{q} \times \hat{f} > q^* \times f^*$. This would be inconsistent with any external research bought before MiFID II. In other words, the fund would have been better off producing all research in-house and hiring only a discount broker to execute trading orders. Therefore,

$$\hat{a} \leq a - c^* \tag{15}$$

This implies that $\hat{q} \leq q^*$ and $\hat{f} \leq f^*$ and, therefore:

$$\hat{q} \times \hat{f} \leq q^* \times f^*$$

In other words, without external research, the maximum fees a fund could collect would be the same as the fees collected after passing research costs to investors. Moreover, the maximum value added would be $\hat{V} = \hat{q}(\hat{a} - b\hat{q}) = \frac{\hat{a}^2}{4b}$. Comparing $\hat{V}$ with V^* in (11) and given (15) it follows that $\hat{V} < V^*$ for all $c < 2$. These results are summarized in the following proposition.

Proposition 2 *If a fund wants to raise more fees or add more value internalizing research than passing it to investors it should pay hard dollars for external research.*

Assume now that the fund internalizes research and is willing to pay the hard dollars for it. Moreover, let us assume that those hard dollars were observable. This would correspond to a firs-best scenario. Fund performance net of fees is equal to $E(\alpha) = a - bq - f$. In equilibrium, money flows into the fund until $E(\alpha) = 0$ which implies that the management fee should be equal to $f = a - bq$. The fund, therefore, solves for the optimal size that maximizes dollar fees net of the hard dollars $H(q) = qc^*$ it must pay for research. Let $\bar{q}$ denote the solution to this problem:

$$\max_q q(a - bq) - H(q)$$

It is immediate to see that the fund chooses a size

$$\bar{q} = \frac{a - c^*}{2b} = q^*$$

and a management fee

$$\bar{f} = \frac{a + c^*}{2} > f^*$$

That is, when the fund internalizes research and it pays hard dollars for it, the optimal fund size is the same as when the fund passes research costs to investors but it charges them a higher management fee. Moreover, since $\bar{q} = q^*$, it follows from (12) that

$$\bar{H} = \bar{q}c^* = H^*$$

The dollar fees collected by the fund net of the hard dollars paid for research are

$$\bar{q} \times \bar{f} - \bar{H} = \frac{a^2(2-c)^2}{16b} = q^* \times f^*$$

In other words, the fund's net profit would be the same under both alternatives. Finally, let $\bar{V} = \bar{q} \times \bar{f}$ denote the value added to investors when funds internalize research and pay hard dollars for it. Since $\bar{H} = H^*$, it follows that

$$\bar{V} = \bar{q} \times \bar{f} = q^* \times f^* - H^* = V^*$$

That is, both alternatives add the same value to investors, whom, in any case, should expect zero net performance after fees. We summarize these results in the following proposition:

Proposition 3 *If hard dollars paid for research by the fund were observable, funds would be indifferent between internalizing research costs, charge higher management fees, and pay hard dollars for research and, alternatively, passing the hard dollar expense directly to investors in exchange for a lower management fee. In both cases, they would add the same value to investors and the expected fund performance net of fees and commissions would be zero.*

3.3 Empirical predictions

In this section we use the three propositions derived from our model to derive some testable empirical predictions.

As Proposition 1 shows, the EU regulators understood correctly the agency cost of bundled commissions. By imposing the unbundling of trading and research costs, they expected to curb inducement and the associated excessive portfolio turnover. As a consequence, fund net performance should increase. This is our first testable prediction.

Prediction 1 *After the unbundling rule introduced by MiFID II we expect that funds that used to bundle trading and research costs in a single commission reduce their portfolio turnover and increase their net performance.*

However, regarding the choice that fund management companies were given between internalizing (and, arguably, expensing) research costs or, alternatively, passing them to shareholders trough RPAs, the regulator seems to have overlooked the role of asymmetric information in the first option. In the first-best scenario, with observable research expenses, funds and investors woudl be indifferent between both

4 Data

This section describes our approach to constructing the database and the necessary variables for our tests.[10] The initial sample consists of US and Europe-domiciled (including the UK) open-end equity mutual funds in the Morningstar database from January 2014 through December 2019. We merge the US-domiciled sample with a database of annual fund N-SAR fillings from SEC.[11]

[10] Table A1 in the Appendix contains a detailed description of the source and calculation for each of our variables.

[11] Registered investment companies are required to file Form N-CEN starting on June 1, 2018. Before that period, these investment companies were required by the Investment Company Act of 1940 to file N-SAR reports with the Securities and Exchange Commission (SEC) for the first six months period of the fiscal year (NSAR-A) and the entire twelve months of the fiscal year (NSAR-B). Our study focuses on the annual NSAR-B fillings from 20214-2017 and N-CEN from 2018-2019.

4.1 Morningstar data

From Morningstar, we obtain share class-level data on monthly net returns, total net assets (TNA), expense ratios, portfolio turnover, load fees, and inception date. The returns are net of fees, expenses, and brokerage commissions before deducting any front-end or back-end loads. We then aggregate this share class-level data to fund level, value-weighting by the TNA in each share class. For the inception date, we use that of the earliest existing share class.

We also use Morningstar to identify the country of sale, investment style, index fund indicator, fund managers, and fund families of each fund in our sample. We use the country of sale to identify equity funds available for sale in the US and/or Europe.[12] We also use the investment style category and index fund indicator to exclude index and sector funds. Our final sample consists of actively managed, diversified global and US equity funds available for sale in the US and/or Europe.

For most of the analyses, our data is at the fund-year level, so for monthly-level variables like net return and TNA, we compute the average of the twelve months before the fund's fiscal year. Other variables like portfolio turnover, expense ratio, and load fees are reported at the fiscal-year end. We assume these annual variables do not change within the fiscal year when we run our analyses at the fund-year-month level. We use the fund family names to calculate the aggregate TNA and the number of funds at the family level. We use the load fee variable to construct the indicator variable *Broker-sold* that takes value one if the fund charges either a front load greater than 1%, a deferred load greater than 1%, or a 12b-1 fee greater than 0.25%, and zero otherwise. We require non-missing data for all of these fund characteristics and to have at least 36 months of returns and 12 months of TNA, expense ratio, and turnover before the date of inclusion in the analysis to estimate factor loadings on different risk-adjusted models and one-year lagged variables. These variables are winsorized at 1% and 99% levels.

[12] Our sample of European countries includes Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Guernsey, Hungary, Iceland, Ireland, Isle of Man, Italy, Jersey, Latvia, Liechtenstein, Lithuania, Luxembourg, Andorra, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Gibraltar, Malta, Monaco, and San Marino.

4.2 SEC N-SAR/N-CEN data

We extract all the annual N-SAR reports filed between 2014 and 2017 and N-CEN between 2018 and 2019 available through the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. From these fillings, we retrieve the average net assets and aggregate brokerage commissions paid by the fund during the fiscal year and whether the fund paid commissions to broker-dealers for brokerage and research services ("soft dollar payments"). Because in the N-SAR reports, brokerage commissions were aggregated and reported at the registered investment company level (series), we also aggregate fund-level brokerage commissions reported in the N-CEN reports at the series level.[13] We use a proration algorithm to allocate brokerage commissions paid at the series level down to the fund level following Edelen et al. (2012); Gokkaya et al. (2023). In particular, we first sum the net assets managed by all the funds in the series and then scale the series' aggregate dollar commission payments by the aggregate series' net assets. We assume that brokerage commission payments per dollar of net assets are similar across funds in the series.

The Morningstar and N-SAR/N-CEN databases are merged by linking the Morningstar fund identifier (FundID) with the registered investment company identifier (CIK). We start by collecting the CIK associated with each FundID as directly reported by Morningstar. For funds in the Morningstar database with missing CIK, we obtain the CIK in a three-step matching process. First, we link share-class Morningstar (SecID) with share-class CRSP (CRSP_fundno) via CUSIP and Ticker. Then, we use the crsp_fundno_cik_map file provided by CRSP to link SecID and CIK. Lastly, as long as one of the SecIDs of a FundID is matched with a CIK, we assign that CIK to that FundID. In case each approach leads to different CIKs for a given FundID, we prioritize the direct matching FundID-CIK over FundID-CRSP_fundno-CIK.

[13] A registered investment company or series consists of one or several funds within a family, generally grouped because of a common date of inception. When a series is initially registered with the SEC, it is assigned a CIK, a unique identifier across the EDGAR system.

4.3 Descriptive statistics

Our final sample includes 2,437 unique US-domiciled funds belonging to 451 fund families from 2014 through 2019. This translates into a total of 12,289 fund-year observations. Our identification strategy involves identifying twin funds, funds managed by the same portfolio managers, under the same investment style, and available for sale in the US and Europe (including the UK). The indicator variable *Twin* takes the value of one if the fund is a twin fund domiciled in the US in a given year. We identify 637 unique US twin funds belonging to 143 fund families. Funds are classified by investment style: first, global versus domestic, and then within US domestic funds, large-cap, mid-cap, and small-cap. Large-cap funds are subdivided into blend, growth, and core. Table 1 presents the number and style classification of US funds and families (total and twins) across all years in the sample. The sample of total (twins) US-domiciled funds ranges from a minimum of 1,883 (422) in 2014 to a maximum of 2,212 (508) in 2018. [14]

[Insert Table 1 about here]

As described in Section 4.2, the annual brokerage commissions variable is defined as the average dollar brokerage commission paid during the fiscal year as a percentage of the average net asset under management during the same reporting period (*Total Commissions (% TNA)*). In addition, we also construct the *Total Commissions (% Volume)*. In this case, the total dollar commissions are scaled by the fund's trading turnover (in %). Trading turnover is the product of the fund's turnover ratio and the fund's monthly average net assets during the fiscal year. We also define *Total Commissions (log)* as the natural logarithm of the aggregate brokerage commissions (in dollars) paid by the fund during the fiscal year. Lastly, we construct several indicator variables based on the information on soft dollars provided by the funds to the SEC: *Soft Dollar* that takes the value of one for funds that have been

[14] For some of our analyses, we use data on the EU twin funds (i.e., twin funds domiciled in Europe, including the UK). Table IA.1 in the Internet Appendix presents the same statistics for these European twin funds. We should note that the number of US and EU twins in a given year does not need to coincide since a US fund may have more than one twin fund domiciled in Europe and vice-versa. Figure IA.1 in the Appendix provides an example of twin funds.

paying commissions to broker-dealers for brokerage and research services during the four years before the regulation took place (2014-2017), zero otherwise; *Soft Dollar Payments* takes a value of one for funds that currently (in a given year) pay commissions to broker-dealers for brokerage and research service, zero otherwise; *Soft Dollar Family* takes the value of one for funds managed by families that currently pays commissions to broker-dealers for brokerage and research services, zero otherwise.

The sample statistics of the final sample of US funds are reported in Table 2. The average US fund in our sample (Panel A) has $1.6 billion of TNA, belongs to a family with $63 billion of TNA that comprises 27 funds, has an expense ratio of 1.16%, turnover of 0.63, and is 2.41 years old. The average monthly net return is 0.82%. 25% of the funds in our sample are broker-sold. The average US twin fund (Panel B) is twice as large ($2.3 billion) but belongs to a family with about the same number of funds (27) and size ($57 billion). The expense ratio (1.15%), turnover (0.61), monthly net return (0.73%), and age (2.42 years) of the average twin fund are very similar to those of the average fund in the full sample. Also, about the same percentage of twin funds (22%) are broker-sold. [15] As for the brokerage commission variables, the average fund in the sample pays 0.09% of TNA and 0.10% of volume in annual brokerage commissions, virtually as much as twin funds pay. The median values are, respectively, 0.05% and 0.02%. Interestingly, we also observe that 81% of the funds pay soft dollar commissions to broker-dealers during the sample period, regardless of whether they are identified as twins. Thus, other than in their size, twin funds are, on average, comparable to the rest of the funds in our sample.

[Insert Table 2 about here]

5 Cross-border impact on US funds

In this section, we test the main hypothesis of this paper: US mutual fund management companies raised commissions of US funds after January 2018 to cross-subsidize the

[15] See Table IA.2 for similar descriptive statistics on our sample of EU twins.

internalized research costs of their European-based funds that had to be *unbundled* from the execution fees after the MiFID II directive became effective on that date.

To test this hypothesis, we follow a difference-in-differences identification strategy. The first difference is the regulatory shock: the MiFID II regulation on unbundling research and execution costs effective after January 2018 in Europe. The second difference is between *treated* funds (US twin funds) and similar *control* funds (US funds with the same style and similar characteristics but without European twins). Therefore, we argue that twin funds share the same equity research and knowledge across the two sides of the Atlantic. This is crucial to interpret the results on fund performance, as it will become clear in the following analysis.

We proceed in two steps. First, in subsection 5.1, we show that the commissions of US funds with European twins increase their commissions after MiFID II relative to US funds without European twins. Then, in subsection 6, we test the effect of MiFID II on the fund performance of US and European twin funds.

5.1 Impact on brokerage commissions

To test our hypothesis on commissions, we run the following regression:

$$Y_{i,t} = \alpha + \beta\, Twin_{i,t} \times Post_t + \gamma\, Twin_{i,t} + \delta\, X_{i,t-1} + \epsilon_{i,t} \tag{16}$$

where $Y_{i,t}$ is *Total Commissions* of fund i in year t either as a fraction of TNA or turnover volume. *Post* as an indicator variable that takes a value of one in 2018 and 2019 (after the MiFID II directive became effective); zero otherwise. The indicator variable *Twin* takes value one if the US fund has a European twin fund with the same portfolio managers and investment style; zero otherwise. $X_{i,t}$ is a set of control variables to ensure that we effectively compare similar funds, and δ is a vector of coefficients, one per control variable. They include fund and family TNA, number of funds in the family, expense ratio, fund turnover, net return, fund age, and the indicator for broker-sold funds. The control variables are lagged by one

year. We introduce $Style \times Time$ fixed effects and adjust for serial correlation by clustering standard errors at the fund level.

Under the null hypothesis (i.e., no cross-subsidy between European and US funds), the interaction term β coefficient is not statistically different from zero. In particular, we test whether the difference in commissions between US twin and their US peers increased after MiFID II regulation became effective, even after controlling for fund style and a set of fund characteristics.

Before discussing the results from regression (16), we present evidence consistent with the hypothesis of parallel trends for the dependent variables between treatment and control funds before MiFID II. This is important since the original directive was approved in May 2014 and transposed into each EU country's legislation mostly during 2017. Thus, there was plenty of debate and discussion during this period until it became effective for all countries in the EU in January 2018.

This evidence is shown in Figure 1. The figure presents a time series analysis, plotting two lines to compare the aggregate brokerage commissions paid by the two types of funds over our sample period. The first line is a black solid line representing the treatment group *twin funds* (US-domiciled funds with at least one EU twin during the fiscal year). The second line is a black-dashed line representing the control group *other funds* (US-domiciled funds without any EU twin funds during the fiscal year). The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. A vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place. It is clear that, no matter how total commissions are scaled, twin funds charged lower commissions than other funds every year before 2018 (although the difference in Figure A is quantitatively smaller than in Figure B). Both types of funds followed a very similar time series pattern, with commissions falling from the end of 2016 to the end of 2017. In 2018, however, twin funds reverted the trend and

started charging more commissions than other funds. This gap widens in 2019.

[Insert Figure 1 about here]

Table 3 presents the coefficients from regression (16). In specifications (1) and (2), the total commissions variable is scaled by TNA. The total commissions variable is scaled by turnover volume in specifications (3) and (4). All specifications include $Style \times Time$ fixed effects. The coefficient β on the interaction term Post $\times$ Twin is positive and significant at 1% across all specifications. It is robust to introducing controls in specifications (2) and (4). Considering specification (2), total commissions as a percentage of the fund's TNA of US twin funds is 3.6 basis points (b.p.) larger than that of US funds with no European twin. This difference is also economically relevant: the average total commission in the full sample is 9 b.p. of TNAs. The results are qualitatively analogous when considering total commissions as a percentage of turnover volume in the specification (4). The coefficient on the interaction term is 9.7 b.p. which is almost the size of the average ratio of total commissions over volume in the full sample, 10 b.p. Consistent with the graphs in Figure 1, without the effect the MiFID II regulation, the commissions charged by twin and other funds (*Twin* indicator variable) is not statistically significant when measured relative to the fund's TNA (plotted in Panel A of Figure 1). However, it is strongly significant when scaled by turnover volume (plotted in Panel B of the same figure).

[Insert Table 3 about here]

Regarding the coefficients on the control variables, they are broadly consistent with those reported in previous analyses of the cross-section of commissions (e.g., Edelen et al. (2012) and Livingston and O'Neal (1998)). Considering specification (2), total commissions scaled by TNA are lower for larger families, funds with higher net performance, and broker-sold funds (all coefficients significant at the 5% level or lower). Commissions are larger for funds with higher expense ratios and turnover (both significant at the 1% level). Finally, the coefficients on fund age and size are not statistically significant. The results in specification (4) are

qualitatively analogous. In general, as expected, funds that belong to larger families may profit from economies of scale by spreading out some fixed component in trade commissions, particularly if they are bundled with research expenses. They may also enjoy some discount by trading volume at the family level. It is interesting to notice that these savings are not replicated at the fund level, suggesting that only the scale and negotiation power at the family level matter to reduce commissions. Livingston and O'Neal (1998) claim that the positive relation between expense ratio and commissions may reflect that funds charge higher management fees when they invest heavily in stocks with higher research costs (bundled with execution costs in the trading commissions), like small-cap stocks, for instance. Since we are controlling for investment style in the regression, this is unlikely the explanation. An alternative and more plausible explanation is that funds that exert less cost control on curbing the TER are equally lax about reducing trading commissions. Thus, higher TERs are not only associated with worse gross performance (Gil-Bazo and Ruiz-Verdú (2009)) but also with higher trading costs. Broker-sold funds charge lower commissions. This, we believe, is suggestive of some substitution between load fees and trading commissions. Finally, as expected, funds with higher turnover (and, arguably, more trading) pay higher commissions. On average, an increase of 100 b.p. in turnover increases commissions by almost 5 b.p.

Figure 2 plots the point estimates and the corresponding 95% confident intervals of the difference in funds' brokerage commission payments between a treatment (with European twin funds) and control (without twin funds) groups with $Style \times Time$ fixed effects, and lagged controls (*fund size, family size, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) for every year from 2014 through 2019. The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the difference in aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. The vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place.

Before MiFID II, the point estimates in both figures are negative and very small in absolute

value (smaller than 0.02 in Figure A and 0.05 in Figure B). At the end of 2018, the point estimate becomes positive and largely significant. In 2019, the coefficient in both figures is even larger and significantly different from zero at the 5% level.

[Insert Figure 2 about here]

5.1.1 Funds with soft dollars

US funds must disclose whether they pay commissions to broker-dealers that bundle research and execution costs ("soft dollars"). We conjecture that if there is a cross-subsidy from US funds towards their European twin funds after MiFID II banned "soft-dollars" in Europe in January 2018, this will show mostly among US twin funds still engaged in "soft-dollar" practices at home.[16]

To test this hypothesis, we include a triple interaction term in equation (16):

$$\begin{aligned} Y_{i,t} = \quad & \alpha + \beta\, Twin_{i,t} \times Post_t + \gamma\, Twin_{i,t} + \lambda\, Soft\, Dollar_{i,t} \times Twin_{i,t} \times Post_t + \\ & \phi\, Soft\, Dollar_{i,t} \times Twin_{i,t} + \theta\, Soft\, Dollar_{i,t} + \delta\, X_{i,t-1} + \epsilon_{i,t} \end{aligned} \tag{17}$$

Soft Dollar is an indicator variable that equals one if the fund paid commissions to broker-dealers for brokerage and research services in the four years before the regulation took place (period 2014-2017); zero otherwise. We add $Style \times Time$ fixed effects and adjust for serial correlation by clustering standard errors at the fund level. The results are reported in Table 5.

Before testing equation (17), Figure 3 shows that before January 2018 (represented by the red vertical line in the graphs), the total commissions charged by funds with European twins were not distinguishable from those charged by the other US funds in our sample without twins. This is true when commissions are scaled by TNA (in Figure A) or turnover volume (in Figure B). After January 2018, both types of funds show a very different pattern.

[16] Table IA.3 in the Internet Appendix shows that US funds with European twins increase their soft dollar practices after MiFID II, except for those that substitute the soft dollar policy with an increase in expense ratio.

Commissions grow significantly for treatment funds with European twins while they decrease (in Figure A) or remain about constant (in Figure B) for control funds without twins.[17]

[Insert Figure 3 about here]

Our object of interest in regression (17) is the coefficient λ on the triple interaction term. Relative to US funds without soft dollars, those that follow this practice and have European twins charge 4.1 extra b.p. in brokerage commissions to TNA after January 2018, according to specification (1). This difference is robust to the inclusion of control variables in the specification (2), and it is significant at the 1% level in both cases. Qualitatively, the conclusion is analogous when total commissions are scaled by turnover volume in specifications (3) -without controls- and (4) -with controls.[18] There is no evidence that funds with European twins that did not engage in soft dollars before MiFID II increased their commissions after the new regulation became effective in Europe.

[Insert Table Table 5 about here]

Similar to Figure 2, Figure 4 plots the point estimates and the corresponding 95% confident intervals of the difference in funds' brokerage commission payments between treatment (with European twin funds) and control (without twins) groups with $Style \times Time$ fixed effects, and lagged controls (*fund size, family size, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) for every year from 2014 through 2019. In this case, we only include funds with "soft dollars." Figures A and B show that the conclusions are sharper than in 2. The difference is zero during the pre-MiFID II years (2014-2017). It becomes positive and significant in 2018 and grows in 2019.[19]

[17]For comparison purposes, Figure IA.2 represents the total commissions of the treatment and control groups of US funds without "soft dollars." As before, in Panel A, commissions are scaled by TNA, while in Panel B, the variable *commissions* is scaled by turnover volume. In either case, treatment and control funds follow a similar downward-sloping trend after MiFID II. This contrasts sharply with the divergent trends followed by treatment and control funds with soft dollars after January 2018, shown in Figure 3.

[18]These results are also robust to measuring twin funds by the aggregate TNA of European twin funds associated with the fund. Table IA.4 in the Internet Appendix presents the results.

[19]The analogous point estimates for funds with no soft dollars are reported in Panel A (scaled by TNA) and B (scaled by volume) of Figure IA.3. The annual pattern of these estimates and their confidence intervals show no discernible variation after January 2018, represented graphically by the solid vertical line.

[Insert Figure 4 about here]

5.1.2 Placebo test with Canadian twin funds

To test the robustness of our results, we replace the indicator variable *Twin* in regression (16) with the variable *CA Twin* that takes value one when a US funds in our sample has a Canadian twin fund (same management team and investment style); zero otherwise. The variable *Post* is defined as before: it takes value one after the directive MiFID II became effective in January 2018; zero otherwise. In this "placebo test," there is no reason to expect that the coefficient β on the interaction term $Post \times CA\ Twin$ will differ from zero. The results are reported in Table 6. As expected, we cannot reject the null hypothesis of a zero effect of MiFID II on the commissions charged by US funds with Canadian twins after MiFID II became effective in January 2018. When the commissions are scaled by the fund's TNA, the coefficient is indistinguishable from zero in specifications (1) and (2) after introducing the control variables. The coefficients on the controls are very similar to those reported in Table 3. When total commissions are scaled by turnover volume in the specification (3), the coefficient β becomes negative and significant. However, this result is not robust to include control variables in the specification (4), after which it becomes statistically insignificant. Therefore, MiFID II will mechanically impact the commissions of "any" US Twin fund. Only those whose research costs must unbundled after the new regulation (that is, US fund with European twins).

[Insert Table 6 about here]

5.1.3 Including fund fixed effects

Despite the controls introduced in regression (16), it could be argued that funds vary among many unobserved dimensions. Our difference in differences empirical strategy alleviates part of this concern. To further check the robustness of our findings, we introduce fund fixed effects together with $Style \times Time$ fixed effects and the same controls from equation (16). The results are reported in Table 7. In column (1), total commissions are scaled by the fund's

TNA, while in column (2), they are a percentage of the fund's turnover volume. In both cases, the coefficients are significant at the 1% level and almost identical to those reported in, respectively, specification (2) and (4) from Table 3, without fund fixed effects. In specification (3), the dependent variable is the logarithm of the total dollar commissions. The coefficient is 0.106, significant at the 1% level. Hence, on average, the dollar value of total commissions increased by about 10% for the average US twin fund in our sample relative to non-twin funds after 2018. In specifications, whether the fund's (log) TNA or (log) turnover volume changed significantly for twin funds after January 2018. This could boost total commissions as a percentage of either TNA or volume, even if the dollar value of commissions did not change much. The coefficients on the interaction term $Post \times Twin$ for both variables are not statistically different from zero. Thus, we cannot reject the null hypothesis that neither scaling variable remained unchanged after MiFID II was effective.

[Insert Table 7 about here]

5.2 Impact on US fund performance

In the last section, we showed that, after the MiFID II directive became effective in January 2018, commissions have increased significantly for US funds with European twins. This raise is concentrated among funds that employ soft dollar arrangements with their brokers and dealers. This begs the question of who has profited from this raise in commissions. To answer this question, we will use the same difference in differences identification strategy laid out in equation (16) but replace the dependent variable with different measures of risk-adjusted fund performance, both for US funds and their European twins.

The null hypothesis is that the rise in commissions for US twin funds is not a transfer of research costs across the Atlantic. The commissions are collected by the fund but contributed to by the investors. Hence, under this hypothesis, the gross performance before management fees and other fees included in the TER of US twin funds (like 12b-1 fees) should decrease after MiFID II relative to that of US funds without European twins after January 2018. The management company would fully appropriate this increase in commissions, and any expense

in research paid with "European soft dollars" before January 2018 would not be replaced with the increase in the "American soft dollars." Under this assumption, we should expect no difference in performance between European twins and similar European funds without US twins since having a twin would not imply any advantage in the available equity research information.[20]

The alternative hypothesize is that the increase in commissions for US funds is, at least partially, a transfer of the research costs that used to be borne by the "European soft dollars" and became part of the "American soft dollars" after MiFID II forced European funds to expense them effectively. Under this hypothesis, the gross performance of the European twins should be higher than that of similar European funds without US twins since they would profit from the extra information bought with the "American soft dollars."[21]

The commissions paid to brokers or dealers are not included in the fund's expense ratio. Therefore, funds may compensate, at least partially, the increase in commissions by decreasing other expenses included in the TER. The negative relation between total commissions and the fund's TER documented in the last section points in the opposite direction. In any case, we will test our hypothesis using both gross and net fund performance.

As a first step, we need to estimate fund risk-adjusted performance. We follow the standard procedure in the literature and estimate four risk-adjusted alphas per fund. The first alpha is calculated with respect to the market (the CAPM alpha); the second alpha is estimated relative to the Fama and French (1992) three-factor (FF3) model that includes the market, *small-minus-big (SMB)*, and *high-minus-low (HML)* risk factors. We add the momentum risk factor of Carhart (1997) into the FF4 model. Finally, the FF4 model is augmented with a Global risk factor in FF4 + Global. For every fund i and year t, we estimate alpha as follows:

[20] Let us recall that twin funds are selected based on having the same portfolio managers and style. Hence, the same equity research is presumably shared by the fund managers who make portfolio decisions for funds with the same investment style across both sides of the Atlantic.

[21] This expected outperformance of European twins could be partially eroded or neutralized by higher internalized research expenses of European funds without a US twin. In that case, we could not distinguish between the null and alternative hypotheses. This is, ultimately, an empirical question.

$$\alpha_{i,t} = r_{i,t} - r_{f,t} - \hat{\beta}^0_{i,t} - \sum_f \hat{\beta}^f_{i,t} Factor^f_t \tag{18}$$

where $r_{i,t}$ is the net (alternative, gross) annual return of fund i in year t; r_f is the yield on the one-year Treasury bill; $\hat{\beta}^0_{i,t}$ and $\hat{\beta}^f_{i,t}$ are, respectively, the constant and the beta estimated with respect to the corresponding risk factor $Factor^f$, with f ranging from 1 (for the CAPM alpha) to 5 (for the FF4+Global alpha). Gross performance is calculated by adding back expenses (estimated as the product of the fund's TER $\times$ TNA). In contrast, betas are estimated using the last 60 monthly observations (with a minimum of 36 observations).[22]

We replace the dependent variable in equation (16) with each of the four estimated alphas and run the regressions including the same controls plus the new control variable *Fund Flows*. Regressions include $Style \times Time$ fixed effects, and standard errors are clustered at the fund level. The estimated coefficients with net performance alphas are presented in Table 8. Consistent with our hypothesis, the net alpha of US funds with European twins decreases by about 23 b.p. after January 2018. This result is statistically significant at the 1% level across the four alphas. Results are almost identical when alphas are estimated using gross returns (reported in Table IA.5 in the Internet Appendix).

[Insert Table 8 about here]

To confirm that the underperformance of US funds with European twins is due to the cross-subsidy of the European research costs now covered by the "American soft dollars" we introduce in our test the triple interaction $Soft\ Dollar\ Payments \times Post \times Twin$, where *Soft Dollar Payments* is an indicator variable for funds that currently pay commissions to broker-dealers for brokerage and research services; zero otherwise.

We replace the dependent variable in equation (17) with the four estimated alphas. The coefficients are reported in Table 9. On average, US twin funds that pay their brokers or

[22] To ensure that our findings are robust to incubation and backfill biases (Evans, 2010), we include only results for funds with at least 36 months of return data.

dealers with soft dollars outperform those that do not bundle execution and research expenses by about 18 b.p. per year. However, consistent with our hypothesis, after MiFID II, funds with soft dollar payments underperform those without by about 27 b.p. per year, statistically significant at the 1% level. Conversely, the coefficient on the triple interaction term is statistically insignificant for the US with funds without soft dollar payments. This evidence supports that the underperformance of US twin funds after MiFID II is driven by those funds with soft dollar arrangements.[23]

[Insert Table 9 about here]

6 Impact on EU fund performance and fees

We now run equation (16) using the net alphas estimated for European funds with US twins. Results are reported in Table 10. We can easily reject the null hypothesis: European twins exhibit alphas about 13 b.p. higher than other US funds with twins. The results are very similar when we use gross alphas in Table IA.6 in the Internet Appendix.

[Insert Table 10 about here]

Therefore, the joint evidence presented in Table 8 and Table 10 allows to reject the null hypothesis and supports (our) alternative hypothesis: the increase in commissions of US funds with European twins reflects, at least in part, a transfer of research expenses paid by the European investors through their soft dollar fees until MiFID II and paid after that by the soft dollars of US investors.

Lastly, in Table 11, we study whether European twins increase their expense ratio after MiFID II. While European twins with a soft dollar policy get subsidized by their US counterparts, those funds without a soft dollar policy alleviated their internalized costs caused by the unbundling regulation by increasing the expense ratio.

[23] As an additional robustness test, we repeat the same analysis using US funds with Canadian twins. The results of this placebo test are reported in Table IA.7 in the Internet Appendix). As expected, the coefficient is not statistically different from zero for any of the four alphas.

[Insert Table 11 about here]

7 Conclusion

While MiFID II contained many new regulations for EU financial markets, the unbundling of research and execution fees was one of the most controversial of these provisions. With security regulators and market participants in other countries, including the US, closely following the EU's commission experiment, the success or failure of this new regulation is of great importance for financial markets. From the outset, the two options granted to EU funds for paying for commissions, expensing them internally or passing them on to investors, suggested the possibility of a compelling natural experiment. However, with almost no investment advisors choosing to pass these expenses onto investors, this possible comparison never truly materialized.

To overcome this issue, we focus on an alternative channel for bundling research payments available to some, but not all, EU funds: their US twins. We find evidence that for EU funds with twins, their US counterparts increase their total commission spending (as a percentage of TNA) and their commission rate (as a percentage of trading turnover). Without direct transfers from their EU counterparts to compensate them for such bundling, this incremental increase in commission spending constitutes an effective cross-border subsidization.[24]

While this observed cross-subsidization raises issues of legality and fairness, it also provides us with a unique opportunity to measure the impact of bundled research payments on performance. Using the same regulatory shock, we find that even though EU investors likely did not pay the costs associated with these bundled research commissions, a statistically significant improvement in performance is observed. Hence, we could conclude not all bundled research was originally spurious.

Our analysis offers an important perspective on the regulation and pricing of equity

[24]These transfers would violate article 29 of the Commission Directive 2010/43/EU, which states that member should make sure that management companies only charge to their investors "regulatory levies or legal fees, which, by their nature, cannot give rise to conflicts with the management company's duties to act honestly, fairly and professionally in accordance with the best interests of the UCITS"

research. While the dramatic market events affecting performance before and after the bundling rules became effective make it difficult to assess whether or not it has improved performance, our setting allows us to explore the performance transfer from funds subject to the EU regulation (EU twins) to their US counterparts (US twins). The performance difference between these two types of funds offers great insight into whether bundling is good for investors.

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Table 1: US Funds sample over time and across styles

This table reports the total number of funds and fund families as well as fund and fund families with European twins in our data set. Twin funds are defined as those managed by the same team, under the same investment style, and available for sale in the US and Europe (including the UK). US twins are funds domiciled in the US, and EU twins are funds domiciled in Europe. Our sample of European countries includes Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Guernsey, Hungary, Iceland, Ireland, Isle of Man, Italy, Jersey, Latvia, Liechtenstein, Lithuania, Luxembourg, Andorra, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Gibraltar, Malta, Monaco, and San Marino. US Twin Families are fund families that offer at least one twin fund in the US and in Europe. The number of funds and fund families is reported over our sample period (Panel A) and across the different investment styles included in our sample (Panel B). The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. US equity funds are further sorted into large-cap blend, large-cap growth, large-cap value, mid-cap, and small-cap as classified by Morningstar.

Panel A: Sample over time

	2014	2015	2016	2017	2018	2019
Total US Funds	1883	1990	1971	2131	2212	2102
Total US Families	462	498	505	522	524	505
US Twin Funds	422	451	462	497	508	473
US Twin Families	116	123	120	124	124	121

Panel B: Sample across styles

	Global	US Large-cap			US Mid-cap	US Small-cap
		Blend	Growth	Value		
Total US Funds	956	296	312	269	327	455
Total US Families	315	188	177	155	187	218
US Twin Funds	322	71	90	60	38	56
US Twin Families	110	40	49	35	25	29

Table 2: Fund-level sample characteristics

This table presents fund-level descriptive statistics. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. Panel A reports the statistics for the full sample, and Panel B is restricted to US Twins (funds managed by the same team under the same investment style and available for sale in both the US and Europe). All the variables are measured annually and include brokerage commissions paid by the fund over the fiscal year (logarithm, scaled by average net assets during the reporting period, and scaled by turnover volume), whether the fund pays commissions to broker-dealers for brokerage and research services, fund TNA ($millions), family TNA ($billions), number of funds managed by the family, annual expense ratio, annual fund turnover, average monthly net return over the fiscal year, the years since fund's inception date, and whether the fund is distributed through brokers. A complete list of definitions for these variables is provided in Table A1 in the Appendix.

Panel A: Full Sample

	mean	sd	p25	p50	p75	N
Fund TNA ($MM)	1600.15	3523.32	69.06	332.59	1298.87	12289
Family TNA ($BB)	62.76	128.51	1.84	17.13	47.41	12289
Family Funds (#)	27.11	37.72	5.00	17.00	34.00	12289
Expense Ratio	1.16	0.42	0.93	1.17	1.40	12289
Fund Turnover	0.63	0.68	0.26	0.45	0.77	12289
Net Return	0.82	1.07	0.07	0.85	1.58	12289
Fund Age	2.41	0.83	1.82	2.57	3.04	12289
Broker-sold Fund	0.25	0.43	0.00	0.00	1.00	12289
Total Commissions (% TNA)	0.09	0.17	0.03	0.05	0.09	12289
Total Commissions (% Volume)	0.10	0.47	0.01	0.02	0.05	12289
Total Commissions (log)	8.36	1.89	7.45	8.73	9.70	12289
Soft Dollar Payments	0.81	0.39	1.00	1.00	1.00	12289

Panel B: Twin Funds

	mean	sd	p25	p50	p75	N
Fund TNA ($MM)	2356.56	4389.51	140.36	648.06	2167.87	2813
Family TNA ($BB)	56.72	102.90	10.24	23.58	50.31	2813
Family Funds (#)	26.72	28.28	11.00	20.00	34.00	2813
Expense Ratio	1.15	0.40	0.93	1.15	1.39	2813
Fund Turnover	0.61	0.63	0.27	0.46	0.74	2813
Net Return	0.73	1.15	-0.03	0.81	1.56	2813
Fund Age	2.42	0.83	1.86	2.58	3.04	2813
Broker-sold Fund	0.22	0.42	0.00	0.00	0.00	2813
Total Commissions (% TNA)	0.09	0.19	0.03	0.05	0.08	2813
Total Commissions (% Volume)	0.09	0.49	0.01	0.02	0.05	2813
Total Commissions (log)	8.80	1.55	7.95	9.02	9.89	2813
Soft Dollar Payments	0.81	0.39	1.00	1.00	1.00	2813

Table 3: The Impact of MiFID II on Brokerage Commissions: scaled by assets

This table presents results on the impact of MiFID II research unbundling on funds' brokerage commission payments from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the aggregate brokerage commissions paid by the fund over the fiscal year scaled by the average net assets during the same period. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) are lagged one year. Table A1 in the Appendix provides a complete list of definitions for these variables. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Total Commissions (% TNA)				
	(1)	(2)	(3)	(4)	(5)
Post × Twin	0.035***	0.036***	0.036***	0.036***	0.032***
	(3.24)	(3.29)	(3.33)	(3.31)	(3.08)
Twin	-0.011*	-0.009	-0.009	-0.009	-0.008
	(-1.79)	(-1.55)	(-1.53)	(-1.59)	(-1.38)
Post	-0.027***	-0.021***			
	(-6.38)	(-5.35)			
Fund Size		-0.000	-0.000	-0.000	-0.000
		(-0.21)	(-0.27)	(-0.24)	(-0.21)
Family Size		-0.020***	-0.020***	-0.020***	-0.020***
		(-6.20)	(-6.16)	(-6.19)	(-6.19)
Family Funds		0.018***	0.018***	0.018***	0.018***
		(4.04)	(4.10)	(4.06)	(4.07)
Expense Ratio		0.038***	0.039***	0.037***	0.038***
		(5.39)	(5.91)	(5.29)	(5.34)
Fund Turnover		0.049***	0.049***	0.049***	0.049***
		(5.68)	(5.68)	(5.68)	(5.66)
Net Return		-0.005***	-0.008***	-0.007***	-0.006***
		(-3.61)	(-3.96)	(-3.72)	(-3.29)
Fund Age		0.004	0.004	0.004	0.004
		(1.26)	(1.20)	(1.35)	(1.32)
Broker-sold Fund		-0.011**	-0.013**	-0.011**	-0.011**
		(-2.00)	(-2.26)	(-2.00)	(-2.00)
Style Fixed Effects	Yes	Yes	No	Yes	Absorbed
Time Fixed Effects	No	No	Yes	Yes	Absorbed
Style x Time Fixed Effects	No	No	No	No	Yes
Observations	12289	12289	12289	12289	12289
Adjusted R^2	0.007	0.080	0.080	0.080	0.080

Table 4: The Impact of MiFID II on Brokerage Commissions: scaled by turnover volume

This table presents results on the impact of MiFID II research unbundling on funds' brokerage commission payments from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the aggregate brokerage commissions paid by the fund over the fiscal year scaled by the fund's average net assets or turnover volume during the same period. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) are lagged one year. Table A1 in the Appendix provides a complete list of definitions for these variables. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Total Commissions (% Volume)				
	(1)	(2)	(3)	(4)	(5)
Post × Twin	0.111***	0.112***	0.113***	0.112***	0.097***
	(3.88)	(3.97)	(3.99)	(3.97)	(3.58)
Twin	-0.043***	-0.045***	-0.042***	-0.045***	-0.040***
	(-3.70)	(-4.23)	(-4.27)	(-4.28)	(-3.87)
Post	-0.030**	-0.012			
	(-2.41)	(-1.29)			
Fund Size		0.003	0.003	0.003	0.003
		(0.91)	(0.87)	(0.87)	(0.92)
Family Size		-0.040***	-0.039***	-0.040***	-0.040***
		(-4.60)	(-4.48)	(-4.57)	(-4.57)
Family Funds		0.039***	0.039***	0.040***	0.039***
		(3.53)	(3.45)	(3.52)	(3.51)
Expense Ratio		0.040**	0.042**	0.040**	0.041**
		(2.23)	(2.54)	(2.16)	(2.24)
Fund Turnover		0.269***	0.268***	0.269***	0.269***
		(6.76)	(6.76)	(6.76)	(6.75)
Net Return		-0.011***	-0.015***	-0.013**	-0.010**
		(-2.66)	(-2.76)	(-2.51)	(-2.19)
Fund Age		0.020**	0.018**	0.020***	0.020**
		(2.53)	(2.45)	(2.60)	(2.55)
Broker-sold Fund		-0.036**	-0.036***	-0.036**	-0.036**
		(-2.47)	(-2.59)	(-2.47)	(-2.47)
Style Fixed Effects	Yes	Yes	No	Yes	Absorbed
Time Fixed Effects	No	No	Yes	Yes	Absorbed
Style x Time Fixed Effects	No	No	No	No	Yes
Observations	12289	12289	12289	12289	12289
Adjusted R^2	0.003	0.176	0.176	0.176	0.177

Table 5: The Impact of MiFID II on Brokerage Commissions: Soft Dollar Funds

This table presents results on the impact of MiFID II research unbundling on funds' brokerage commission payments based on whether the fund pays soft dollars from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets or turnover volume during the same period. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. *Soft Dollar* is an indicator variable that equals one if the fund paid commissions to broker-dealers for brokerage and research services in the four years before the regulation took place (period 2014-2017) and zero otherwise. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) are lagged one year. Table A1 in the Appendix provides a complete list of definitions for these variables. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Total Commissions (% TNA)		Total Commissions (% Volume)	
	(1)	(2)	(3)	(4)
Soft Dollar=0 × Post × Twin	-0.015	-0.012	0.014	0.038
	(-0.78)	(-0.58)	(0.35)	(0.81)
Soft Dollar=1 × Post × Twin	0.041***	0.040***	0.113***	0.108***
	(3.57)	(3.50)	(3.66)	(3.58)
Soft Dollar=0 × Twin	-0.050***	-0.052***	-0.194***	-0.233***
	(-2.88)	(-2.78)	(-4.51)	(-5.01)
Soft Dollar=1 × Twin	-0.002	-0.001	-0.009	-0.008
	(-0.36)	(-0.21)	(-0.94)	(-0.98)
Soft Dollar	-0.075***	-0.047***	-0.200***	-0.105***
	(-6.93)	(-5.23)	(-4.82)	(-4.75)
Controls	No	Yes	No	Yes
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	12289	12289	12289	12289
Adjusted R^2	0.028	0.088	0.024	0.185

Table 6: The Impact of MiFID II on Brokerage Commissions: Placebo Test

This table presents results on the impact of MiFID II research unbundling on funds' brokerage commission payments from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets or turnover volume during the same period. The treatment group (*CA Twin*) includes US-domiciled funds with at least one Canadian twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without Canadian twin funds during the fiscal year. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) are lagged one year. Table A1 in the Appendix provides a complete list of definitions for these variables. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Total Commissions (% TNA)		Total Commissions (% Volume)	
	(1)	(2)	(3)	(4)
Post × CA Twin	0.005	0.003	-0.044**	-0.042
	(0.67)	(0.25)	(-2.27)	(-0.83)
CA Twin	-0.061***	-0.036***	-0.040**	0.013
	(-8.10)	(-2.63)	(-2.34)	(0.25)
Fund Size		-0.000		0.003
		(-0.08)		(0.82)
Family Size		-0.020***		-0.040***
		(-6.28)		(-4.60)
Family Funds		0.018***		0.039***
		(4.12)		(3.54)
Expense Ratio		0.037***		0.041**
		(5.35)		(2.26)
Fund Turnover		0.049***		0.269***
		(5.66)		(6.74)
Net Return		-0.005***		-0.009**
		(-3.14)		(-1.99)
Fund Age		0.004		0.020**
		(1.25)		(2.56)
Broker-sold Fund		-0.012**		-0.035**
		(-2.03)		(-2.46)
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	12289	12289	12289	12289
Adjusted R^2	0.007	0.079	0.003	0.175

Table 7: The Impact of MiFID II on Commissions, TNA, and Volume: Fund FE

This table presents results on the impact of MiFID II research unbundling on brokerage commissions, portfolio size, and turnover volume from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable in columns (1) and (2) is the aggregate brokerage commissions paid by the fund over the fiscal year, scaled by the fund's average net assets and turnover volume. The dependent variable in columns (3), (4), and (5) is the logarithm of the dollar amount of brokerage commissions, average net assets, and turnover volume, respectively. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) are lagged one year. Table A1 in the Appendix provides a complete list of definitions for these variables. In these DiD specifications, we add fund fixed effects to control for any time-invariant characteristics of the funds. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Total Commissions			TNA (log $)	Volume (log $)
	(% TNA)	(% Volume)	(log $)		
	(1)	(2)	(3)	(4)	(5)
Post × Twin	0.034***	0.093***	0.106***	0.006	0.017
	(2.96)	(3.25)	(2.66)	(0.16)	(0.42)
Twin	-0.011	-0.032	0.066	0.073*	0.028
	(-1.06)	(-1.26)	(1.19)	(1.74)	(0.50)
Fund Size	0.000	0.010	0.094***		0.075***
	(0.12)	(1.32)	(5.68)		(3.90)
Fund Turnover	0.008	0.051*	-0.024	-0.063**	
	(1.39)	(1.82)	(-0.76)	(-2.10)	
Family Size	0.029***	0.040***	0.414***	0.435***	0.378***
	(3.89)	(2.65)	(11.71)	(11.09)	(7.88)
Family Funds	-0.018*	-0.058**	-0.308***	-0.433***	-0.433***
	(-1.89)	(-2.47)	(-5.67)	(-8.17)	(-6.85)
Net Return	-0.005***	-0.016***	0.019***	0.033***	0.022***
	(-2.80)	(-2.90)	(2.70)	(4.83)	(2.72)
Fund Age	-0.018	-0.060**	-0.005	0.184***	0.120*
	(-1.56)	(-2.00)	(-0.09)	(3.84)	(1.93)
Broker-sold Fund	0.014	0.051**	-0.030	-0.120***	-0.070
	(1.32)	(2.00)	(-0.60)	(-2.69)	(-1.25)
Style x Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	12289	12289	12289	12289	12289
Adjusted R^2	0.327	0.433	0.913	0.929	0.906

Table 8: The Impact of MiFID II on Fund Performance

This table presents results on the impact of MiFID II research unbundling on fund performance from difference-in-differences models. The sample includes monthly data from January 2017 to December 2018, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the fund net performance measured by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at the current period. The control group includes US-domiciled funds with the same investment style but without any EU twin funds at the current period. The *Post* variable equals one in 2018 and zero in 2017. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, fund age, and fund flows*) are lagged one year. A complete list of definitions for the annual version of these variables is provided in Table A1 in the Appendix. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance			
	CAPM	FF3	FF4	FF4+Global
Post × Twin	-0.253***	-0.231***	-0.230***	-0.165***
	(-7.30)	(-6.77)	(-6.82)	(-5.12)
Twin	0.201***	0.158***	0.165***	0.186***
	(7.34)	(6.57)	(6.83)	(7.53)
Fund Size	-0.003	-0.008*	-0.009*	-0.004
	(-0.48)	(-1.72)	(-1.79)	(-0.83)
Family Size	0.011	0.025***	0.027***	0.026***
	(0.95)	(2.87)	(3.18)	(2.92)
Family Funds	0.005	-0.022*	-0.026**	-0.024*
	(0.28)	(-1.75)	(-2.13)	(-1.88)
Expense Ratio	0.031	0.032	0.033*	0.041**
	(1.16)	(1.63)	(1.70)	(2.00)
Fund Turnover	-0.017	-0.030***	-0.033***	-0.028***
	(-1.18)	(-2.86)	(-3.21)	(-2.63)
Fund Age	-0.010	-0.015	-0.022*	-0.005
	(-0.67)	(-1.30)	(-1.94)	(-0.47)
Fund Flows	-0.000	-0.000	-0.000	-0.000
	(-0.00)	(-0.65)	(-0.71)	(-0.71)
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	45302	45302	45302	45302
Adjusted R^2	0.520	0.454	0.435	0.244

Table 9: The Impact of MiFID II on Fund Performance: Soft Dollar Funds

This table presents results on the impact of MiFID II research unbundling on fund performance from difference-in-differences models. The sample includes monthly data from January 2017 to December 2018, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the fund net performance measured by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at the current period. The control group includes US-domiciled funds with the same investment style but without any EU twin funds at the current period. The *Post* variable equals one in 2018 and zero in 2017. *Soft Dollar Payments* is an indicator variable for funds that pay commissions to broker-dealers for brokerage and research services. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, fund age, and fund flows*) are lagged one year. A complete list of definitions for the annual version of these variables is provided in Table A1 in the Appendix. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance			
	CAPM	FF3	FF4	FF4+Global
Soft Dollar Payments=0 × Post × Twin	-0.123*	-0.078	-0.091	-0.033
	(-1.69)	(-1.12)	(-1.28)	(-0.48)
Soft Dollar Payments=1 × Post × Twin	-0.286***	-0.268***	-0.266***	-0.202***
	(-7.38)	(-7.09)	(-7.18)	(-5.64)
Soft Dollar Payments=0 × Twin	0.118**	0.047	0.078	0.116**
	(2.01)	(0.84)	(1.33)	(2.03)
Soft Dollar Payments=1 × Twin	0.214***	0.175***	0.178***	0.196***
	(7.27)	(6.81)	(6.95)	(7.50)
Soft Dollar Payments	0.038	-0.001	0.001	-0.007
	(1.59)	(-0.05)	(0.03)	(-0.35)
Controls	Yes	Yes	Yes	Yes
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	45257	45257	45257	45257
Adjusted R^2	0.521	0.455	0.436	0.244

Table 10: The Impact of MiFID II on EU Twins Performance

This table presents results on the impact of MiFID II research unbundling on fund performance from difference-in-differences models. The sample includes monthly data from January 2017 to December 2018, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US and Europe (including the UK). The dependent variable is the fund net performance measured by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor. The treatment group (*EU Twin*) includes EU-domiciled funds with at least one US twin at the current period. The control group includes US-domiciled funds with at least one EU twin at the current period. The *Post* variable equals one in 2018 and zero in 2017. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, fund age, and fund flows*) are lagged one year. A complete list of definitions for the annual version of these variables is provided in Table A1 in the Appendix. We include style x family fixed effects to compare the performance of EU twins against US twins within the same investment style and fund family. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance			
	CAPM	FF3	FF4	FF4+Global
Post × EU Twin	0.133**	0.138**	0.141***	0.129**
	(2.35)	(2.48)	(2.61)	(2.47)
EU Twin	-0.127***	-0.104**	-0.105**	-0.103**
	(-2.81)	(-2.40)	(-2.42)	(-2.32)
Fund Size	-0.008	-0.014*	-0.014*	-0.009
	(-0.99)	(-1.91)	(-1.90)	(-1.19)
Family Size	0.540***	0.604***	0.693***	0.571***
	(2.81)	(3.23)	(3.86)	(3.33)
Family Funds	-0.005	-0.133	-0.223	-0.196
	(-0.02)	(-0.59)	(-1.02)	(-0.95)
Expense Ratio	0.084**	0.082**	0.085**	0.097**
	(2.00)	(2.19)	(2.22)	(2.45)
Fund Turnover	-0.009	-0.021	-0.017	-0.016
	(-0.40)	(-0.88)	(-0.71)	(-0.60)
Fund Age	-0.014	0.001	-0.013	0.017
	(-0.57)	(0.03)	(-0.60)	(0.70)
Fund Flows	-0.000	-0.000*	-0.000	-0.000*
	(-1.41)	(-1.84)	(-1.63)	(-1.88)
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Style x Family Fixed Effects	Yes	Yes	Yes	Yes
Observations	17381	17381	17381	17381
Adjusted R^2	0.590	0.579	0.556	0.365

Table 11: The Impact of MiFID II on EU Twins Expense Ratio

This table presents results on the impact of MiFID II research unbundling on funds' expense ratio from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US and Europe (including the UK). The dependent variable is the total annual expenses and fees divided by year-end TNA (in %). The expense ratio includes the fund's administrative and management fees but does not include brokerage commissions or other transaction costs. The treatment group (*EU Twin*) includes EU-domiciled funds with at least one US twin at fiscal year-end. The control group includes US-domiciled funds with at least one EU twin at fiscal year-end. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. *Soft Dollar Family* is an indicator variable for funds managed by families that currently pay commissions to broker-dealers for brokerage and research services. Control variables (*fund size, family size, family funds, fund turnover, net return, and fund age.*) are lagged one year. Table A1 in the Appendix provides a complete list of definitions for these variables. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Expense Ratio (%)			
	(1)	(2)	(3)	(4)
Post × EU Twin	0.032	0.045**		
	(1.47)	(2.45)		
EU Twin	0.405***	0.231***		
	(12.63)	(7.34)		
Soft Dollar Family=0 × Post × EU Twin			0.123***	0.078***
			(3.12)	(2.85)
Soft Dollar Family=1 × Post × EU Twin			-0.031	0.016
			(-0.94)	(0.63)
Soft Dollar Family=0 × EU Twin			0.364***	0.234***
			(9.74)	(6.82)
Soft Dollar Family=1 × EU Twin			0.426***	0.228***
			(11.77)	(6.73)
Controls	Yes	Yes	Yes	Yes
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Style x Family Fixed Effects	No	Yes	No	Yes
Observations	4677	4651	4677	4651
Adjusted R^2	0.269	0.615	0.271	0.615

Figure 1: Brokerage Commissions over Time

The figure presents a time series analysis, with two distinct lines plotted to compare the aggregate brokerage commissions paid by two different types of funds over our sample period. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The first line is a solid black line representing our treatment group *Twin Funds* (US-domiciled funds with at least one EU twin during the fiscal year). The second line is a black-dashed line representing our control group *Other Funds* (US-domiciled funds without any EU twin funds during the fiscal year). The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. A vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place.

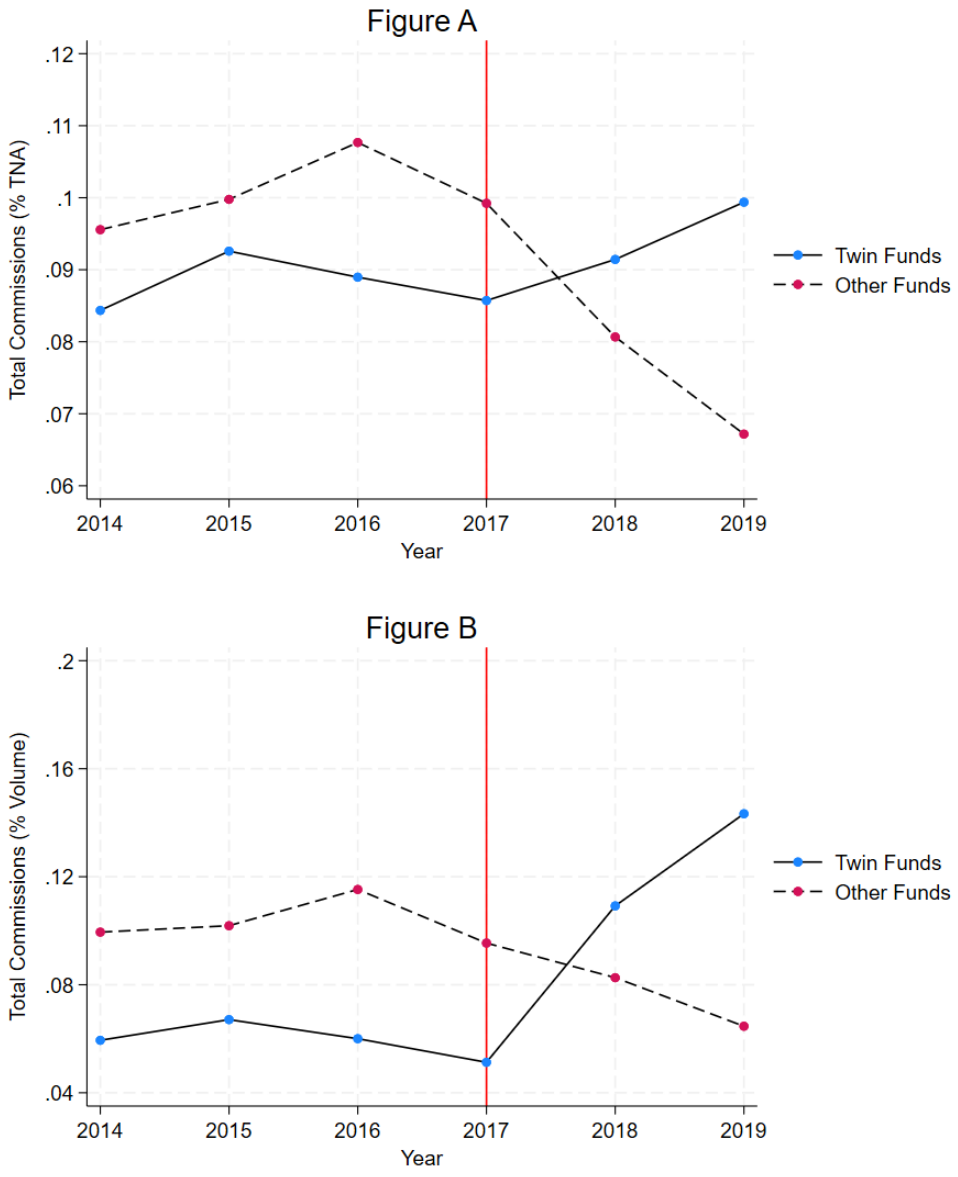
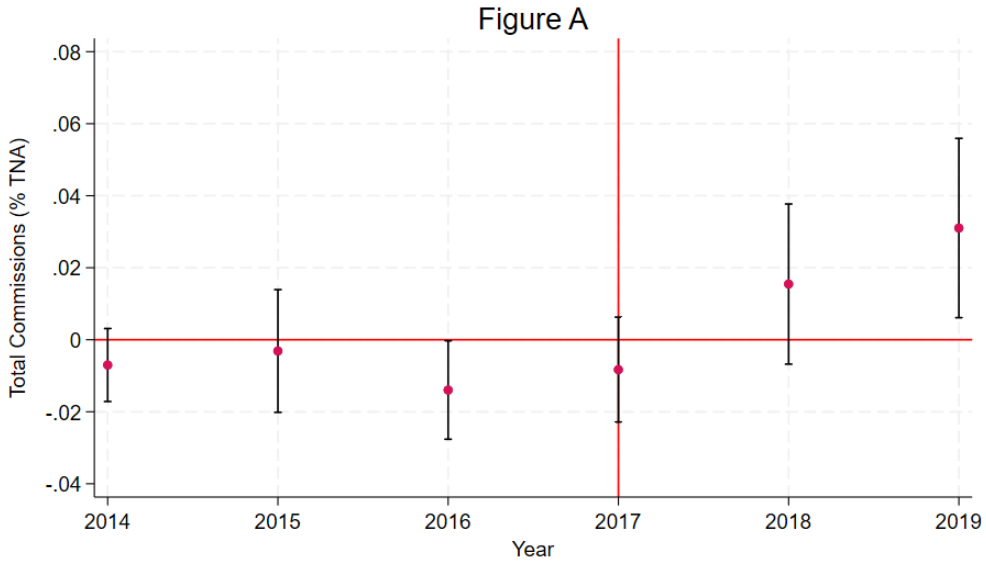


Figure 2: The Impact of MiFID II on Brokerage Commissions

This figure plots point estimates and 95% confident intervals of the differences in funds' brokerage commission payments between a treatment and control group from a panel regression, with style x time fixed effects, and lagged controls (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*). The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. A vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place. We adjust for serial correlation by clustering standard errors at the fund level.



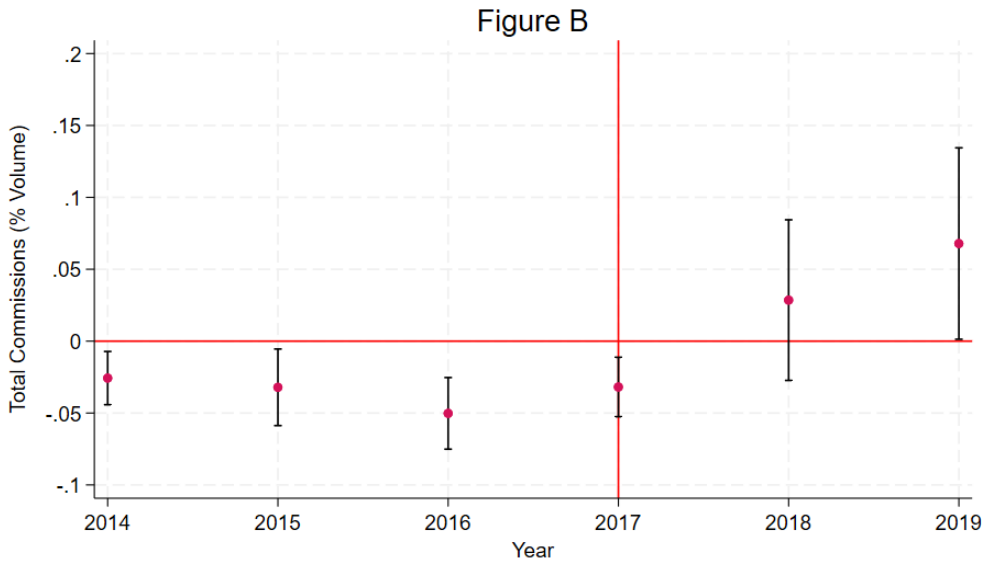


Figure 3: Brokerage Commissions over Time: Soft Dollar Funds

The figure presents a time series analysis, with two distinct lines plotted to compare the aggregate brokerage commissions paid by two different types of funds over our sample period. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end, domiciled in the US, and paid commissions to broker-dealers for brokerage and research services in the four years before the regulation took place. The first line is a solid black line representing our treatment group *Twin Funds* (US-domiciled funds with at least one EU twin during the fiscal year). The second line is a black-dashed line representing our control group *Other Funds* (US-domiciled funds without any EU twin funds during the fiscal year). The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. A vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place.

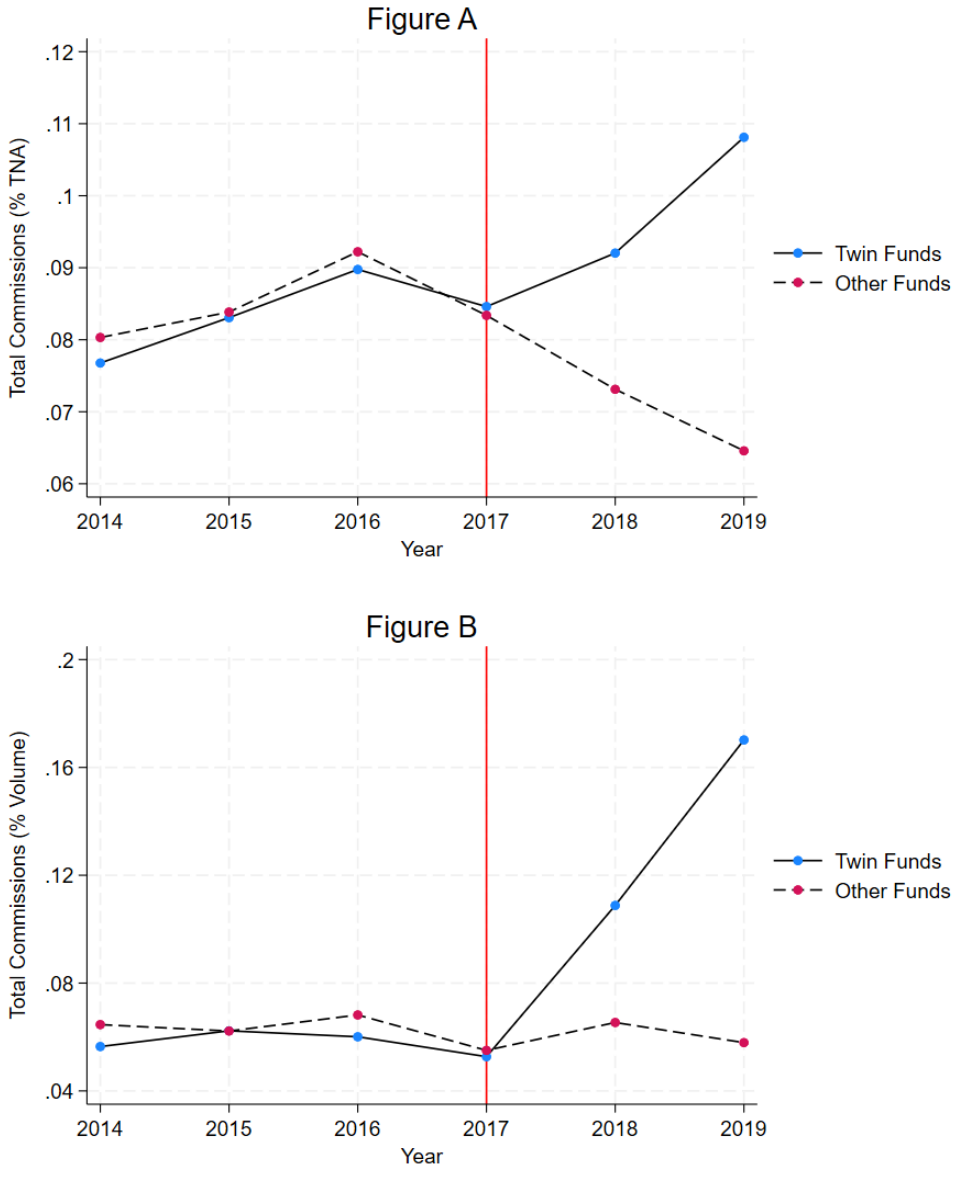
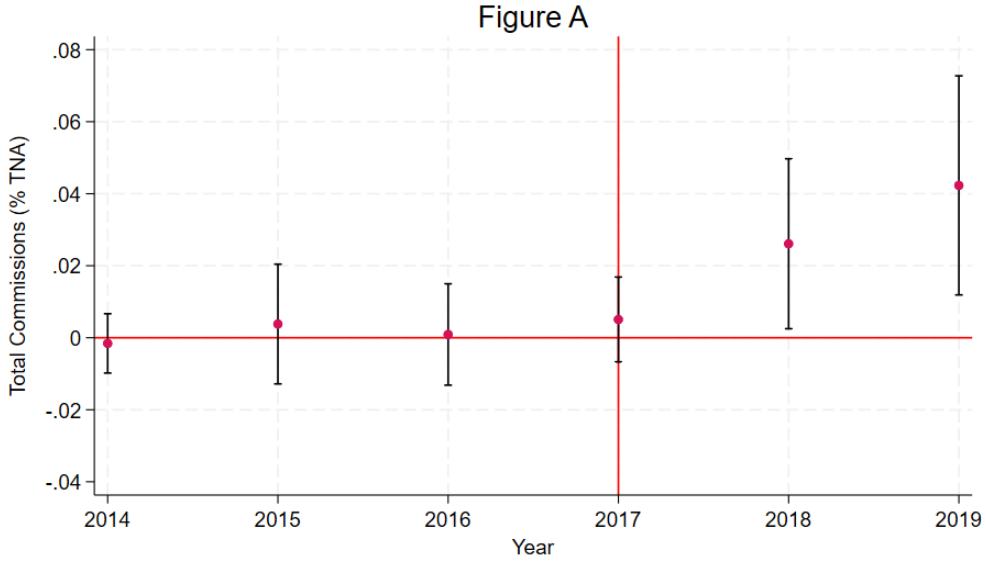
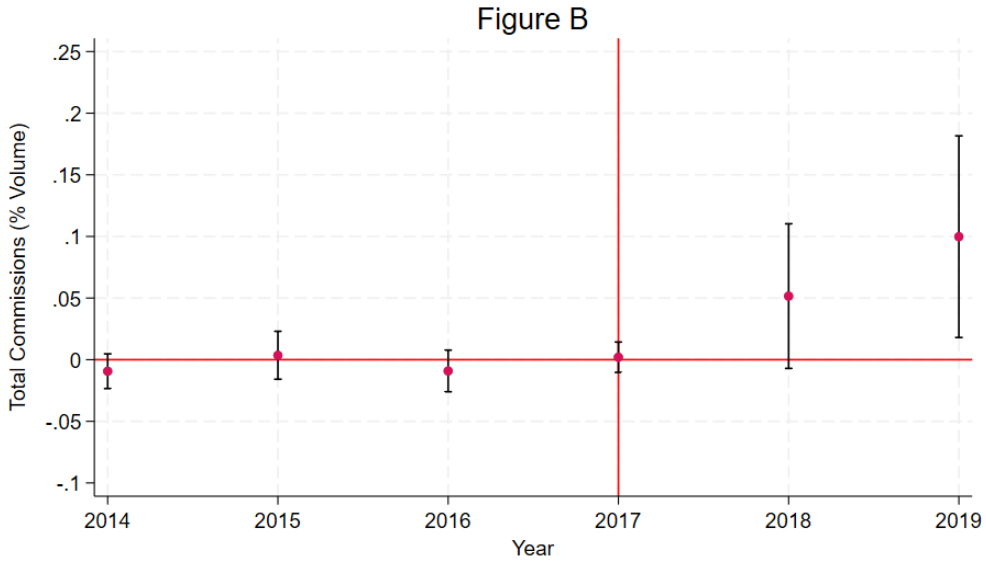


Figure 4: The Impact of MiFID II on Brokerage Commissions: Soft Dollar Funds

This figure plots point estimates and 95% confident intervals of the differences in funds' brokerage commission payments between a treatment and control group from a panel regression, with style x time fixed effects, and lagged controls (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*). The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end, domiciled in the US, and paid commissions to broker-dealers for brokerage and research services in the four years before the regulation took place. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. A vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place. We adjust for serial correlation by clustering standard errors at the fund level.





Appendix

Table A1: Variable definitions

Variable	Definition
Broker-sold Fund	Indicator variable for funds with broker-sold share classes. Broker-sold share classes charge either a front load greater than 1%, a deferred load greater than 1%, or a 12b-1 fee greater than 0.25%.
Expense Ratio	Total annual expenses and fees divided by year-end TNA (in %). The expense ratio includes the fund's administrative and management fees but does not include brokerage commissions or other transaction costs.
Family Funds	Natural logarithm of the number of funds within the fund family at fiscal year-end.
Family Size	Natural logarithm of monthly average aggregate TNA of all funds in the family during the fiscal year.
Fund Age	Number of years since the fund inception date at the fiscal year-end.
Fund Flows	Net annual growth in fund assets beyond reinvested dividends defined as $Flows_t = [TNA_t - TNA_{t-12} \times (1 + Ret_t)] \div [TNA_{t-12} \times (1 + Ret_t)]$ (in %).
Fund Performance	Monthly fund net performance is measured by either net-of-fee monthly returns or by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor. The CRSP value-weighted stock index net of the one-month Treasury rate is used as the market factor. The SMB (size factor), HML (book-to-market factor), and WML (momentum factor) factors are obtained from Kenneth French's website. The MSCI World Index data are from the MSCI's website. We estimate each fund's factor loadings for each month using a 60-month rolling estimation window (with a minimum of 36 observations).
Fund Performance (Gross)	Monthly fund gross performance is measured by either after-fee monthly returns or by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor using after-fee fund returns.
Fund Size	Natural logarithm of monthly average TNA (Total Net Assets under management) during the fiscal year.
Fund Turnover	Minimum of the fund's dollar purchases and sales during the fiscal year, scaled by the fund's average total net assets. This measure excludes trades induced by fund inflows and outflows, thus capturing largely discretionary trades. This is the measure of turnover that funds report to the Securities and Exchange Commission.
Global Fund	Indicator variable for funds with a global investment style as defined by Morningstar.
Net Return	Monthly average fund net-of-fee return during the fiscal year (in %).
Post	Indicator variable for years 2018 and 2019 and zero for the period 2014-2017.
Soft Dollar	Indicator variable for funds that have been paying commissions to broker-dealers for brokerage and research services during the four years before the regulation took place (2014-2017).
Soft Dollar Payments	Indicator variable for funds that currently pay commissions to broker-dealers for brokerage and research services as disclosed in N-CEN form (Item C.18) or N-SAR form (Item 26.B).
Soft Dollar Family	Indicator variable for funds managed by families currently paying commissions to broker-dealers for brokerage and research services.
Twin	Indicator variable for US-domiciled funds managed by the same team and under the same investment style as other identical funds available for sale in Europe (including the UK).
Twin Size	Natural logarithm of monthly average aggregate TNA of European twin funds associated with the fund during the fiscal year.
EU Twin	Indicator variable for funds domiciled in Europe (including the UK) managed by the same team and under the same investment style as other identical funds available for sale in the US.
CA Twin	Indicator variable for US-domiciled funds managed by the same team and under the same investment style as other identical funds available for sale in Canada.
Total Commissions (log)	Natural logarithm of the aggregate brokerage commissions paid by the fund during the fiscal year as reported in N-CEN form (Item C.16.b) and N-SAR form (Item 21).
Total Commissions (% TNA)	Total Commissions scaled by the fund's monthly average net assets during the fiscal year as reported in N-CEN form (Item C.19) and N-SAR form (Item 75.B) (in %).
Total Commissions (% Volume)	Total Commissions scaled by the fund's trading turnover (in %). Trading turnover is the product of the fund's turnover ratio and the fund's monthly average net assets during the fiscal year.

Internet Appendix for
"MiFID II Research Unbundling:
Cross-border Impact on Asset Managers"

In this Appendix, we provide additional statistics and robustness tests for the analyses in the article. Specifically:

- Table IA.1: Sample of EU Twins over Time and across Styles
- Table IA.2: Fund-level sample characteristics of EU Twins
- Table IA.4: The Impact of MiFID II on Brokerage Commissions: EU Twins Size
- Table IA.3: The Impact of MiFID II on Soft Dollar Payments
- Table IA.5: The Impact of MiFID II on Fund Performance: Gross Returns
- Table IA.6: The Impact of MiFID II on EU Twins Performance: Gross Returns
- Table IA.7: The Impact of MiFID II on Fund Performance: Placebo Test
- Figure IA.1: Example of twin funds
- Figure IA.2: Brokerage Commissions over Time: No Soft Dollar Funds
- Figure IA.3: The Impact of MiFID II on Brokerage Commissions: No Soft Dollar Funds

Table IA.1: Sample of EU Funds over Time and across Styles

This table reports the number of EU-domiciled funds and fund families with US twins in our data set. Twin funds are defined as those managed by the same team, under the same investment style, and available for sale in the US and Europe (including the UK). US twins are funds domiciled in the US, and EU twins are funds domiciled in Europe. Our sample of European countries includes Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Guernsey, Hungary, Iceland, Ireland, Isle of Man, Italy, Jersey, Latvia, Liechtenstein, Lithuania, Luxembourg, Andorra, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Gibraltar, Malta, Monaco, and San Marino. EU Twin Families are fund families that offer at least one twin fund in the US and Europe. The number of funds and fund families is reported over our sample period (Panel A) and across the different investment styles included in our sample (Panel B). The sample is based on global and US equity diversified actively managed open-end funds domiciled in Europe from 2014 to 2019. US equity funds are further sorted into large-cap blend, large-cap growth, large-cap value, mid-cap, and small-cap as classified by Morningstar.

Panel A: Sample over time

	2014	2015	2016	2017	2018	2019
EU Twin Funds	393	422	467	502	496	465
EU Twin Families	108	115	124	129	125	124

Panel B: Sample across styles

	Global	US Large-cap			US Mid-cap	US Small-cap
		Blend	Growth	Value		
EU Twin Funds	435	64	55	34	27	37
EU Twin Families	109	41	37	23	24	26

Table IA.2: Fund-level sample characteristics of EU Funds

This table presents descriptive statistics for the sample of global and US equity diversified actively managed open-end funds domiciled in Europe (including the UK) from 2014 to 2019. The sample includes EU-domiciled funds with US twins in our data set. All the variables are measured annually and include fund TNA ($millions), family TNA ($billions), number of funds managed by the family, average monthly net return over the fiscal year, the years since the fund's inception date, annual expense ratio, and the annual fund turnover. Detailed variable definitions are in Table A1 in the Appendix.

EU Twin Funds

	mean	sd	p25	p50	p75	N
Fund TNA ($MM)	7032.90	12794.76	182.87	1122.09	6348.82	2745
Family TNA ($BB)	349.53	411.98	30.16	211.45	487.11	2745
Family Funds (#)	67.07	56.42	21.00	56.00	119.00	2745
Expense Ratio	1.44	0.52	1.12	1.41	1.71	2600
Fund Turnover	0.71	0.76	0.19	0.47	0.93	1834
Net Return	0.50	1.36	-0.49	0.35	1.53	2745
Fund Age	2.12	0.82	1.52	2.15	2.79	2745
Soft Dollar Family	0.61	0.49	0.00	1.00	1.00	2745

Table IA.3: The Impact of MiFID II on Soft Dollar Payments

This table presents results on the impact of MiFID II research unbundling on funds' soft dollar payments from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable indicates funds that pay commissions to broker-dealers for brokerage and research services. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. *Expense Ratio* is the total annual expenses and fees divided by year-end TNA (in %). The expense ratio includes the fund's administrative and management fees but does not include brokerage commissions or other transaction costs. Control variables (*fund size, family size, family funds, fund turnover, net return, fund age, and broker-sold fund*) are lagged one period. Table A1 in the Appendix provides a complete list of definitions for these variables. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Soft Dollar Payments				
	(1)	(2)	(3)	(4)	(5)
Post × Twin × Expense Ratio	-0.139**	-0.139***	-0.139**	-0.137**	-0.126**
	(-2.58)	(-2.58)	(-2.57)	(-2.56)	(-2.39)
Post × Twin	0.122**	0.123**	0.122**	0.113*	0.118**
	(2.02)	(2.03)	(2.02)	(1.87)	(2.00)
Twin	-0.051	-0.050	-0.051	-0.049	0.049
	(-1.06)	(-1.04)	(-1.06)	(-1.01)	(0.86)
Twin × Expense Ratio	0.025	0.025	0.025	0.025	-0.043
	(0.62)	(0.61)	(0.61)	(0.61)	(-0.91)
Post × Expense Ratio	0.134***	0.135***	0.134***	0.140***	0.131***
	(4.74)	(4.75)	(4.74)	(4.85)	(4.55)
Post	-0.261***				
	(-7.80)				
Fund Size	0.005	0.005	0.005	0.005	-0.003
	(1.09)	(1.15)	(1.08)	(1.08)	(-0.39)
Family Size	0.037***	0.037***	0.037***	0.037***	0.004
	(3.66)	(3.71)	(3.66)	(3.67)	(0.18)
Family Funds	0.003	0.002	0.003	0.003	-0.081***
	(0.21)	(0.14)	(0.20)	(0.19)	(-3.02)
Expense Ratio	-0.020	-0.023	-0.020	-0.022	-0.161***
	(-0.86)	(-1.00)	(-0.86)	(-0.95)	(-4.40)
Fund Turnover	-0.075***	-0.076***	-0.075***	-0.075***	-0.019**
	(-6.80)	(-6.87)	(-6.80)	(-6.77)	(-2.08)
Net Return	-0.004	-0.005	-0.005	-0.005	-0.012***
	(-1.37)	(-1.23)	(-1.30)	(-1.16)	(-3.35)
Fund Age	0.002	0.002	0.002	0.002	0.114***
	(0.21)	(0.21)	(0.22)	(0.20)	(4.44)
Broker-sold Fund	-0.006	-0.004	-0.006	-0.006	0.022
	(-0.47)	(-0.28)	(-0.46)	(-0.45)	(0.92)
Style Fixed Effects	Yes	No	Yes	Absorbed	Absorbed
Time Fixed Effects	No	Yes	Yes	Absorbed	Absorbed
Style x Time Fixed Effects	No	No	No	Yes	Yes
Fund Fixed Effects	No	No	No	No	Yes
Observations	12289	12289	12289	12289	12289
Adjusted R^2	0.077	0.076	0.077	0.076	0.548

Table IA.4: Research Unbundling and Brokerage Commissions: EU Twins Size

This table presents results on the impact of MiFID II research unbundling on funds' brokerage commission payments based on whether the fund pays soft dollars from difference-in-differences models. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets or turnover volume during the same period. *Twin Size* is the natural logarithm of the monthly average aggregate TNA of European twin funds associated with the fund during the fiscal year. The *Post* variable equals one in 2018 and 2019 and zero for 2014-2017. *Soft Dollar* is an indicator variable that equals one if the fund paid commissions to broker-dealers for brokerage and research services in the four years before the regulation took place (period 2014-2017) and zero otherwise. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*) are lagged one period. Table A1 in the Appendix provides a complete list of definitions for these variables. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Total Commissions (% TNA)		Total Commissions (% Volume)	
	(1)	(2)	(3)	(4)
Post × Twin Size	0.001***		0.004***	
	(2.65)		(3.27)	
Twin Size	-0.000		-0.002***	
	(-1.64)		(-3.95)	
Soft Dollar=0 × Post × Twin Size		-0.001*		0.000
		(-1.74)		(0.21)
Soft Dollar=1 × Post × Twin Size		0.002***		0.005***
		(3.21)		(3.41)
Soft Dollar=0 × Twin Size		-0.003***		-0.012***
		(-2.89)		(-4.76)
Soft Dollar=1 × Twin Size		-0.000		-0.000
		(-0.45)		(-1.20)
Soft Dollar		-0.048***		-0.110***
		(-5.31)		(-4.89)
Controls	Yes	Yes	Yes	Yes
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	12289	12289	12289	12289
Adjusted R^2	0.080	0.089	0.177	0.186

Table IA.5: The Impact of MiFID II on Fund Performance: Gross Returns

This table presents results on the impact of MiFID II research unbundling on fund performance from difference-in-differences models. The sample includes monthly data from January 2017 to December 2018, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the fund gross performance measured by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at the current period. The control group includes US-domiciled funds with the same investment style but without any EU twin funds at the current period. The *Post* variable equals one in 2018 and zero in 2017. Control variables (*fund size, family size, family funds, fund turnover, fund age, and fund flows*) are lagged one year. A complete list of definitions for the annual version of these variables is provided in Table A1 in the Appendix. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance (Gross)			
	CAPM	FF3	FF4	FF4+Global
Post × Twin	-0.251***	-0.228***	-0.227***	-0.162***
	(-7.26)	(-6.69)	(-6.73)	(-5.03)
Twin	0.208***	0.164***	0.171***	0.193***
	(7.51)	(6.71)	(6.98)	(7.71)
Fund Size	-0.012**	-0.018***	-0.018***	-0.014***
	(-1.96)	(-3.55)	(-3.64)	(-2.75)
Family Size	0.007	0.021**	0.023***	0.021**
	(0.62)	(2.35)	(2.64)	(2.38)
Family Funds	0.005	-0.021*	-0.026**	-0.023*
	(0.28)	(-1.67)	(-2.04)	(-1.78)
Fund Turnover	-0.006	-0.019*	-0.023**	-0.017
	(-0.46)	(-1.84)	(-2.20)	(-1.60)
Fund Age	0.002	-0.002	-0.009	0.008
	(0.13)	(-0.20)	(-0.83)	(0.66)
Fund Flows	-0.000	-0.000	-0.000	-0.000
	(-0.25)	(-0.96)	(-1.01)	(-1.10)
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	45302	45302	45302	45302
Adjusted R^2	0.520	0.454	0.435	0.244

Table IA.6: The Impact of MiFID II on EU Twins Performance: Gross Returns

This table presents results on the impact of MiFID II research unbundling on fund performance from difference-in-differences models. The sample includes monthly data from January 2017 to December 2018, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US and Europe (including the UK). The dependent variable is the fund gross performance measured by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor. The treatment group (*EU Twin*) includes EU-domiciled funds with at least one US twin at the current period. The control group includes US-domiciled funds with at least one EU twin at the current period. The *Post* variable equals one in 2018 and zero in 2017. Control variables (*fund size, family size, family funds, fund turnover, fund age, and fund flows*) are lagged one year. A complete list of definitions for the annual version of these variables is provided in Table A1 in the Appendix. We include style x family fixed effects to compare the performance of EU twins against US twins within the same investment style and fund family. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance (Gross)			
	CAPM	FF3	FF4	FF4+Global
Post × EU Twin	0.135**	0.138**	0.141***	0.129**
	(2.39)	(2.48)	(2.60)	(2.47)
EU Twin	-0.085*	-0.062	-0.061	-0.058
	(-1.87)	(-1.43)	(-1.42)	(-1.31)
Fund Size	-0.012	-0.018**	-0.018**	-0.014*
	(-1.53)	(-2.46)	(-2.46)	(-1.79)
Family Size	0.531***	0.597***	0.686***	0.563***
	(2.77)	(3.20)	(3.83)	(3.29)
Family Funds	-0.001	-0.128	-0.216	-0.189
	(-0.00)	(-0.56)	(-0.99)	(-0.92)
Fund Turnover	-0.005	-0.017	-0.013	-0.011
	(-0.20)	(-0.68)	(-0.51)	(-0.41)
Fund Age	-0.005	0.009	-0.005	0.025
	(-0.22)	(0.42)	(-0.21)	(1.06)
Fund Flows	-0.000	-0.000*	-0.000*	-0.001**
	(-1.50)	(-1.92)	(-1.71)	(-1.98)
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Style x Family Fixed Effects	Yes	Yes	Yes	Yes
Observations	17381	17381	17381	17381
Adjusted R^2	0.590	0.579	0.555	0.366

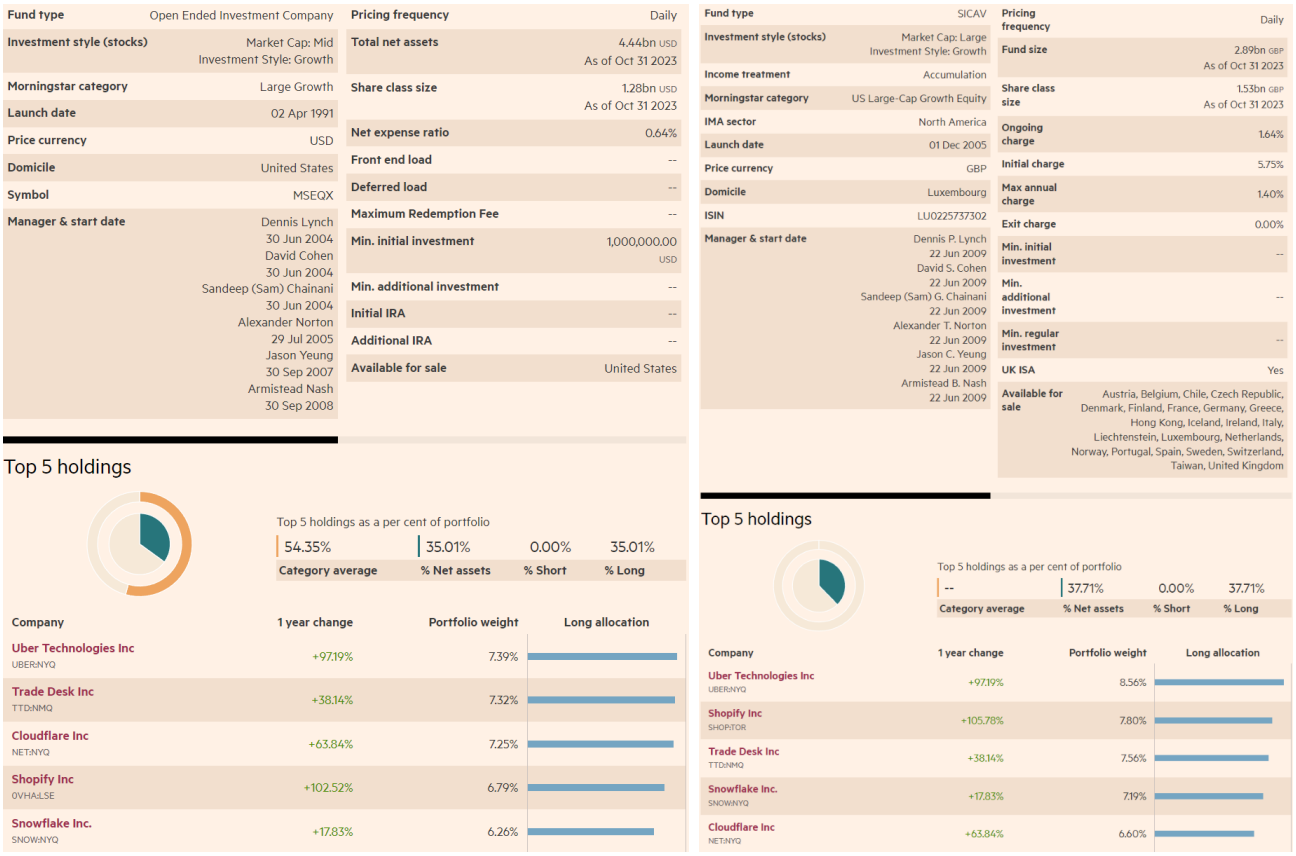
Table IA.7: The Impact of MiFID II on Fund Performance: Placebo Test

This table presents results on the impact of MiFID II research unbundling on fund performance from difference-in-differences models. The sample includes monthly data from January 2017 to December 2018, focusing on actively managed, diversified global and US equity funds that are open-end and domiciled in the US. The dependent variable is the fund net performance measured by the alpha from CAPM, the Fama-French three-factor, Carhart's four-factor, and Carhart's model augmented by the MSCI World Index return factor. The treatment group (*CA Twin*) includes US-domiciled funds with at least one Canadian twin at the current period. The control group includes US-domiciled funds with the same investment style but without any EU twin funds at the current period. The *Post* variable equals one in 2018 and zero in 2017. Control variables (*fund size, family size, family funds, expense ratio, fund turnover, fund age, and fund flows*) are lagged one year. A complete list of definitions for the annual version of these variables is provided in Table A1 in the Appendix. We adjust for serial correlation by clustering standard errors at the fund level. t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance			
	CAPM	FF3	FF4	FF4+Global
Post × Can Twin	0.089	0.070	0.074	0.027
	(1.10)	(0.86)	(0.93)	(0.38)
Can Twin	0.007	0.026	0.024	-0.008
	(0.11)	(0.49)	(0.44)	(-0.14)
Fund Size	-0.001	-0.007	-0.007	-0.001
	(-0.13)	(-1.49)	(-1.50)	(-0.19)
Family Size	0.011	0.024***	0.027***	0.026***
	(0.93)	(2.83)	(3.14)	(2.92)
Family Funds	0.007	-0.021*	-0.025**	-0.021
	(0.39)	(-1.67)	(-2.03)	(-1.63)
Expense Ratio	0.034	0.033*	0.035*	0.047**
	(1.27)	(1.67)	(1.76)	(2.28)
Fund Turnover	-0.016	-0.028***	-0.032***	-0.028**
	(-1.08)	(-2.72)	(-3.06)	(-2.49)
Fund Age	-0.011	-0.015	-0.022**	-0.009
	(-0.78)	(-1.34)	(-1.99)	(-0.75)
Fund Flows	0.000	-0.000	-0.000	-0.000
	(0.09)	(-0.56)	(-0.62)	(-0.61)
Style x Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	45302	45302	45302	45302
Adjusted R^2	0.519	0.453	0.434	0.242

Figure IA.1: Example of twin funds

This figure presents the Morgan Stanley - US Equity Large Growth Funds as an example of an EU-US mutual fund twin in the sample. The same team of portfolio managers currently manages these two funds and have identical holdings. The only difference between these two funds in countries available for sale.



Fund type	Open Ended Investment Company
Investment style (stocks)	Market Cap: Mid Investment Style: Growth
Morningstar category	Large Growth
Launch date	02 Apr 1991
Price currency	USD
Domicile	United States
Symbol	MSEQX
Manager & start date	Dennis Lynch 30 Jun 2004 David Cohen 30 Jun 2004 Sandeep (Sam) Chainani 30 Jun 2004 Alexander Norton 29 Jul 2005 Jason Yeung 30 Sep 2007 Armistead Nash 30 Sep 2008

Pricing frequency	Daily
Total net assets	4.44bn USD As of Oct 31 2023
Share class size	1.28bn USD As of Oct 31 2023
Net expense ratio	0.64%
Front end load	--
Deferred load	--
Maximum Redemption Fee	--
Min. initial investment	1,000,000.00 USD
Min. additional investment	--
Initial IRA	--
Additional IRA	--
Available for sale	United States

Top 5 holdings

Top 5 holdings as a per cent of portfolio

54.35%	35.01%	0.00%	35.01%
Category average	% Net assets	% Short	% Long

Company	1 year change	Portfolio weight	Long allocation
Uber Technologies Inc UBER:NYQ	+97.19%	7.39%	
Trade Desk Inc TTD:NMQ	+38.14%	7.32%	
Cloudflare Inc NET:NYQ	+63.84%	7.25%	
Shopify Inc 0VHA:LSE	+102.52%	6.79%	
Snowflake Inc. SNOW:NYQ	+17.83%	6.26%	

Fund type	SICAV
Investment style (stocks)	Market Cap: Large Investment Style: Growth
Income treatment	Accumulation
Morningstar category	US Large-Cap Growth Equity
IMA sector	North America
Launch date	01 Dec 2005
Price currency	GBP
Domicile	Luxembourg
ISIN	LU0225737302
Manager & start date	Dennis P. Lynch 22 Jun 2009 David S. Cohen 22 Jun 2009 Sandeep (Sam) G. Chainani 22 Jun 2009 Alexander T. Norton 22 Jun 2009 Jason C. Yeung 22 Jun 2009 Armistead B. Nash 22 Jun 2009

Pricing frequency	Daily
Fund size	2.89bn GBP As of Oct 31 2023
Share class size	1.53bn GBP As of Oct 31 2023
Ongoing charge	1.64%
Initial charge	5.75%
Max annual charge	1.40%
Exit charge	0.00%
Min. initial investment	--
Min. additional investment	--
Min. regular investment	--
UK ISA	Yes
Available for sale	Austria, Belgium, Chile, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Taiwan, United Kingdom

Top 5 holdings

Top 5 holdings as a per cent of portfolio

--	37.71%	0.00%	37.71%
Category average	% Net assets	% Short	% Long

Company	1 year change	Portfolio weight	Long allocation
Uber Technologies Inc UBER:NYQ	+97.19%	8.56%	
Shopify Inc SHOP:TOR	+105.78%	7.80%	
Trade Desk Inc TTD:NMQ	+38.14%	7.56%	
Snowflake Inc. SNOW:NYQ	+17.83%	7.19%	
Cloudflare Inc NET:NYQ	+63.84%	6.60%	

Figure IA.2: Brokerage Commissions over Time: No Soft Dollar Funds

The figure presents a time series analysis, with two distinct lines plotted to compare the aggregate brokerage commissions paid by two different types of funds over our sample period. The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end, domiciled in the US, and did not pay commissions to broker-dealers for brokerage and research services in the four years before the regulation took place. The first line is a solid black line representing our treatment group *Twin Funds* (US-domiciled funds with at least one EU twin during the fiscal year). The second line is a black-dashed line representing our control group *Other Funds* (US-domiciled fund without any EU twin funds during the fiscal year). The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. A vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place.

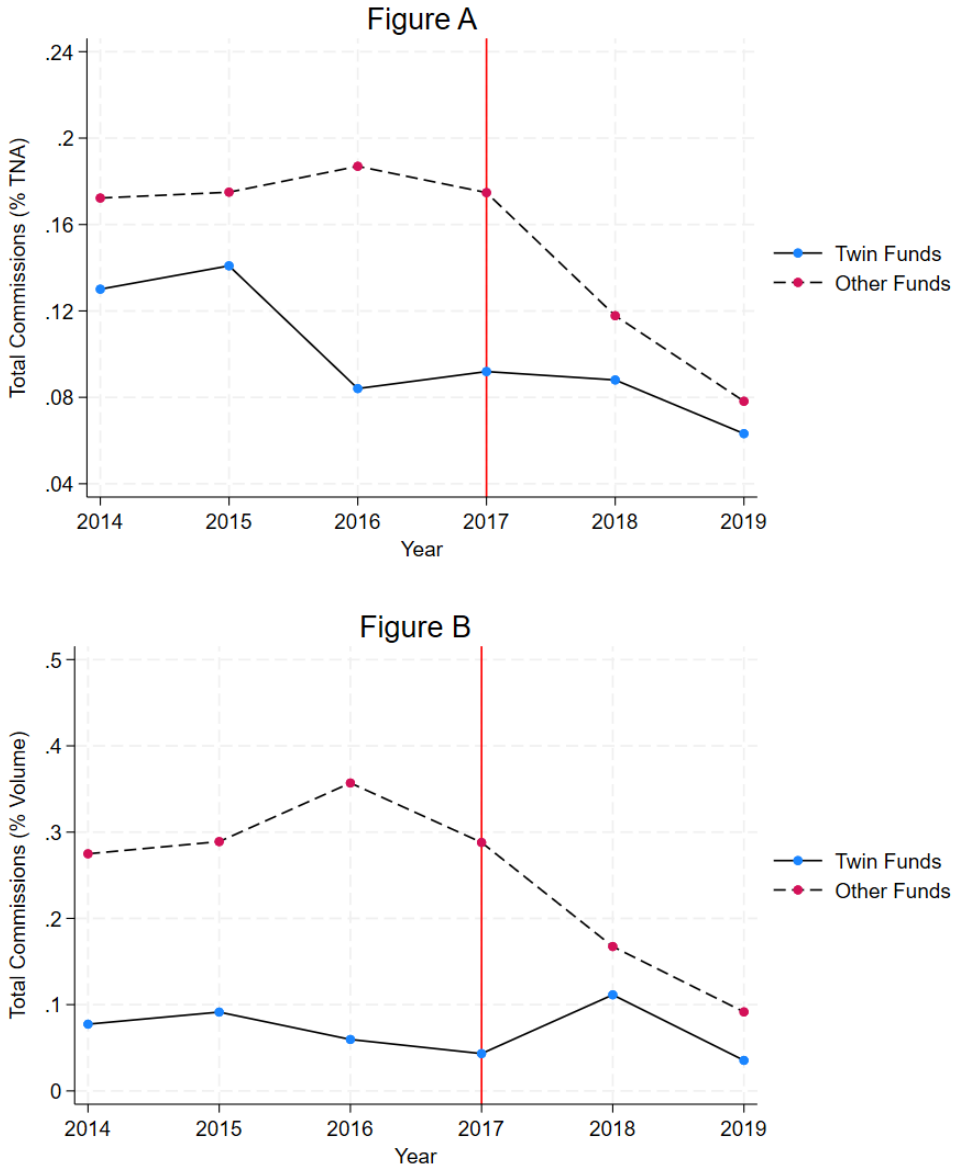


Figure IA.3: The Impact of MiFID II on Brokerage Commissions: No Soft Dollar Funds

This figure plots point estimates and 95% confident intervals of the differences in funds' brokerage commission payments between a treatment and control group from a panel regression, with style x time fixed effects, and lagged controls (*fund size, family size, family funds, expense ratio, fund turnover, net return, fund age, and broker-sold fund*). The sample includes annual data from 2014 to 2019, focusing on actively managed, diversified global and US equity funds that are open-end, domiciled in the US, and did not pay commissions to broker-dealers for brokerage and research services in the four years before the regulation took place. The treatment group (*Twin*) includes US-domiciled funds with at least one EU twin at fiscal year-end. The control group includes US-domiciled funds with the same investment style but without any EU twin funds during the fiscal year. The x-axis of the graph represents the years of our sample. At the same time, the y-axis denotes the aggregate brokerage commissions paid by the fund over the fiscal year scaled by either the fund's average net assets (Figure A) or turnover volume (Figure B) during the same period. A vertical line at year-end 2017 allows us to visually compare the total commissions during the four years before the regulation took place against the two years since the regulation was in place. We adjust for serial correlation by clustering standard errors at the fund level.